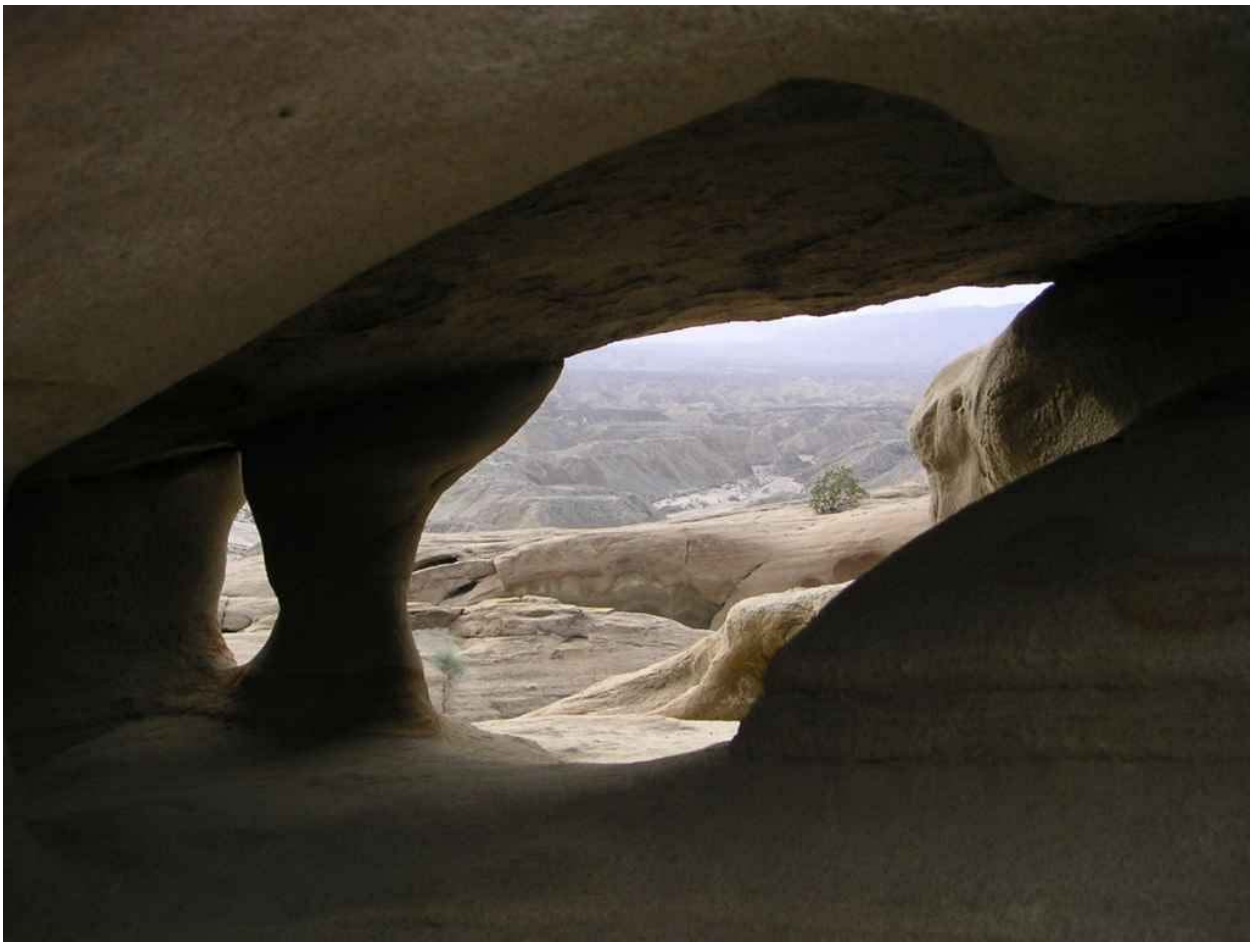
IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT



Wind Cave Ocotillo California: https://dougngayle.weebly.com/california/april-12th-2014

April 12, 2014 and April 13, 2014
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

April 18, 2018

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ACRONYM DESCRIPTIONS

AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HF	Historical Fluctuations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP/PSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns

PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet

I Introduction

On April 12, 2014 and April 13, 2014, State and Local Ambient Air Monitoring Stations (SLAMS) located in Niland (AQS Site Code 06-025-4004) and Brawley (AQS Site Code 06-025-0007), California, measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM) Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average concentrations of 167 µg/m^3 and 166 µg/m^3, respectively. PM_{10} 24-hr measurements above the 150 µg/m^3 are exceedances of the NAAQS. The SLAMS in Niland was the only station in Imperial County to measure an exceedance on April 12, 2014 while the SLAMS in Brawley was the only station in Imperial County to measure an exceedance on April 13, 2014.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON APRIL 12, 2014 AND APRIL 13, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
4/12/2014	**Niland**	**06-025-4004**	**3**	**22**	**167**	**150**
4/13/2014	**Brawley**	**06-025-0007**	**3**	**24**	**166**	**150**
4/12/2014	Brawley	06-025-0007	3	24	103	150
4/13/2014	Niland	06-025-4004	3	23	130	150

All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted
April 12, 2014 and April 13, 2014 were not scheduled sampling days

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size-Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Most recently, since 2013 ICAPCD has been submitting continuous PM_{10} data from BAM 1020s. On April 12, 2014 and April 13, 2014, the Niland and Brawley monitors were impacted by elevated concentrations of particulate matter when strong westerly winds associated with the passing of an upper level trough of low-pressure moved inland across Southern California transporting fugitive windblown dust into Imperial County.

This report demonstrates that the exceedances observed on April 12, 2014 and April 13, 2014, were caused by a naturally occurring event. The event elevated particulate matter affecting air quality, was not reasonably controllable or preventable (nRCP), was in excess of normal historical fluctuations (HF) and would not have occurred "but for" the entrainment of fugitive windblown dust from outlaying deserts and mountains from the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude the PM_{10} 24-hour NAAQS exceedances of 167 µg/m^3 and 166 µg/m^3 as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[1].

[1] "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR 13560, March 22, 2007

I.1 Demonstration Contents

Section II - Describes the April 12, 2014 and April 13, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III - Describes the normal historical fluctuations using data charts, summaries, and time-series graphs, which demonstrate that the elevated concentrations of PM_{10} on April 12, 2014 and April 13, 2014 were in excess of normal historical fluctuations.

Section IV - Provides evidence that the event of April 12, 2014 and April 13, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Discusses and establishes the clear causal relationship between the exceedances at the Niland and Brawley stations and the natural event, which occurred on April 12, 2014 and April 13, 2014, respectively. This section provides evidence that the event affected air quality because of a natural event

Section VI - Brings together the evidence presented within this report and shows a clear causal relationship between the natural event, the exceedance and how BACM was overwhelmed making it nRCP concluding that the exceedances which occurred April 12, 2014 and April 13, 2014 would not have occurred "but for" the natural event.

I.2 Requirements of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, there are additional non-technical requirements that must be met in order for the USEPA to concur with flagged air quality monitoring data.

I.2.a Public Notification that a potential event was occurring

The National Weather Service (NWS) on April 12, 2014 issued a zone forecast for Imperial County that winds 20 to 30 mph and gusts up to 35 miles per hour (mph) could strike the region. The zone forecast also called for patchy areas of blowing dust in southeastern California and the deserts south and east of Phoenix, Arizona. Due to the forecast of elevated winds, the ICAPCD issued a "No Burn" day in Imperial County for April 12, 2014. April 13, 2014 was a “Limited Burn” day due to the forecast for slightly reduced winds of up to 20 mph. **Appendix A** contains copies of notices pertinent to the April 12, 2014 and April 13, 2014 event.

I.2.b Notification to USEPA of the intent to exclude a measured violation (40 CFR §50.14(c)(2)(I))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) air ambient data used for regulatory purposes. Ambient data that is potentially influenced by an exceptional event must be appropriately flagged and initially described and submitted to USEPA according to 40 CFR § 50.14(c)(2)(iii) no later than July 1st of the calendar year following the year in which the flagged measurement occurred.

The ICAPCD made a written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured concentrations in Niland and Brawley. The request, dated May 28, 2015, requested initial flags for the measurement from the BAMs 1020 in Niland and Brawley of 167 µg/m^3 and 166 µg/m^3, respectively. Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. A brief description was included with the initial flag of the meteorological data which indicated a potential natural event had occurred on April 12, 2014 and April 13, 2014.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on January 4, 2017. The notice advised the public that comments were being solicited regarding this demonstration, which supports the request, by the ICAPCD to exclude the measured concentrations of 167 µg/m^3 and 166 µg/m^3, which occurred on April 12, 2014 and April 13, 2014 in Brawley and Niland. The final closing date for comments was February 3, 2017. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(i)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(a)(1-2))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA no later than three years following the end of the calendar quarter in which the flagged concentration was measured or 12 months prior to the date that a regulatory decision must be made by USEPA.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. Currently the submittal of this demonstration has regulatory implications for the PM_{10} SIP scheduled for submittal in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on April 12, 2014 and April 13, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

a The event "affects air quality"
b The event "is not reasonably controllable or preventable."
c The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
d The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that air quality was affected by the exceptional event in Imperial County. There is a clear causal relationship between the event and the measured concentrations in Brawley supporting that the event affected the air quality in Imperial County.

C This demonstration provides evidence that the measured concentration, caused by the event, is in excess of normal historical fluctuations.

D This demonstration provides evidence that "but-for" the event there would have been no exceedance (violation).

II April 12, 2014 and April 13, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the April 12, 2014 and April 13, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**. The Colorado Desert not only includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea which is at 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities are surrounded by agricultural fields to the north, east, west and south (**Figure 2-3)**. Together, the incorporated cities and agricultural fields make up what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas on the eastern and western portions of Imperial County.

FIGURE 2-3
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

Fig 2-3: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

Desert areas to the east and west of Imperial County that are part of the larger Sonoran Desert also extend to the southeast and southwest into Mexico (**Figure 2-4)**. Combined, these deserts are sources of dust emissions which impact the Imperial County during high wind events.

FIGURE 2-4
DESERTS IN CALIFORNIA, YUMA AND MEXICO

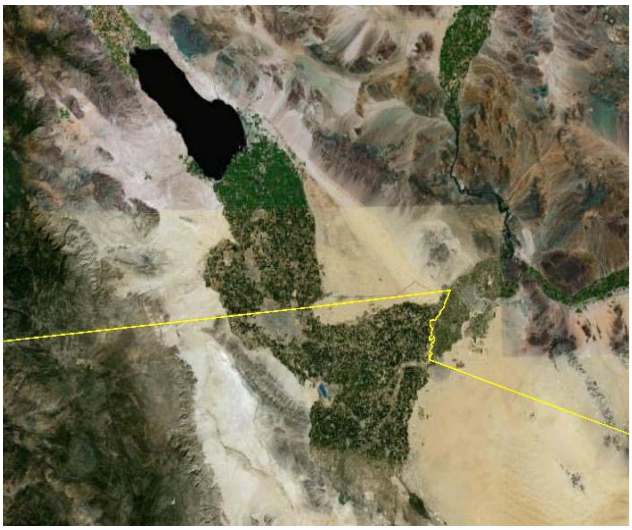

Fig 2-4: Depicts the Sonoran Desert as it extends from southeastern California, southwestern Arizona, and into northern Mexico. Source: Google Earth

The air quality stations and some meteorological monitoring stations used in this demonstration are shown in **Figure 2-5**. SLAMS in Imperial County are located in Calexico, El Centro, Westmorland, and Niland and Brawley. Each station measures air quality and meteorological data. The SLAMS located in Brawley only measures air quality and meteorological data used for this demonstration include stations in Riverside County and Yuma, Arizona (**Figure 2-5 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on April 12, 2014 and April 13, 2014, occurred at the Niland and Brawley stations. **Figure 2-5** shows the Niland and Brawley stations, along with other monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions of meteorological conditions occurring on April 12, 2014 and April 13, 2014, other meteorological sites used in this demonstration include airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma (Arizona) County, and Imperial County, along with other sites relevant to the wind event. A map of these sites can be found in **Appendix B**.

FIGURE 2-5
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

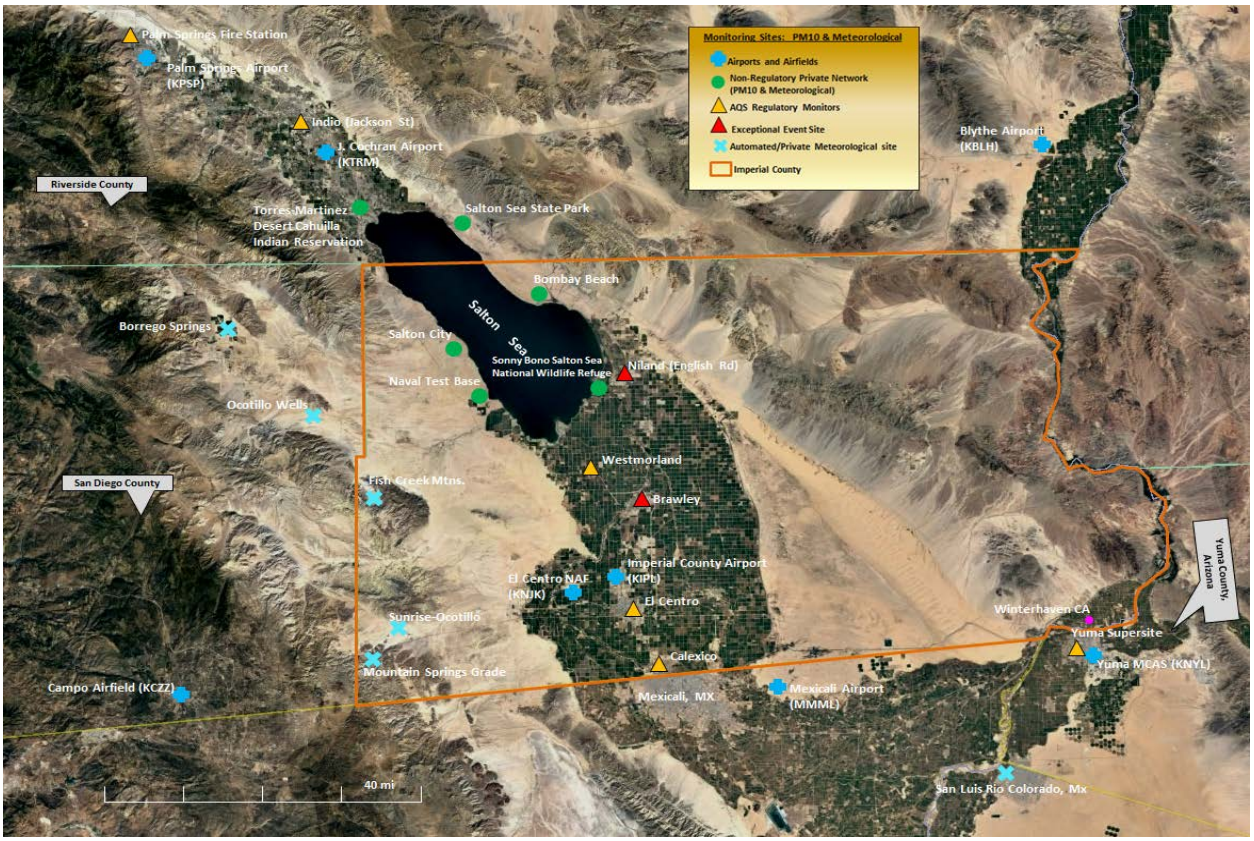

Fig 2-5: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southern San Diego County, southwestern Yuma (Arizona) County, and northern Mexico. The image exemplifies the regional area impacted by the exceptional event, which occurred on April 12, 2014 and April 13, 2014

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY, AND ARIZONA
APRIL 12, 2014 AND APRIL 13, 2014

Monitor Site Name	Operator*	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	Day	24-hr PM_{10} (ug/m^3) Avg	1-hr PM_{10} (ug/m^3) Max	Time of Max Reading	Max Wind Gust (mph)	Time of Max Wind Gust
IMPERIAL COUNTY												
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	12th	-	-	-	16.6	15:00
							13th	-	-	-	7.1	19:00
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	12th	-	-	-	13.7	14:00
							13th	-	-	-	6.9	2:00
Brawley-Main Street #2	ICAPCD	BAM 2010	06-025-0007	(81102)	13701	-15	12th	103	323	17:00	-	-
		BAM 2010					13th	166	576	8:00	-	-
		Hi-Vol Gravimetric					13th	-	-	-	-	-
Westmorland	ICAPCD	BAM 2010	06-025-4003	(81102)	13697	-43	12th	-	-	-	-	-
		BAM 2010					13th	-	-	-	-	-
		Hi-Vol Gravimetric					13th	-	-	-	-	-
Niland-English Road	ICAPCD	BAM 2010	06-025-4004	(81102)	13997	-54	12th	167	482	15:00	21.4	16:00
		BAM 2010					13th	131	218	1:00	13.7	2:00
		Hi-Vol Gravimetric					13th	-	-	-	-	-
RIVERSIDE COUNTY												
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	12th	57	224	20:00	31	15:00
							13th	32	59	2:00	20	9:00
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	12th	243	723	16:00	17	16:00
							13th	161	500	5:00	17	4:00
ARIZONA – YUMA												
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A		12th	81	215	18:00	21	14:00
							13th	48	105.	0:00	13	16:00

CARB = California Air Resources Board
IID = Imperial Irrigation District
ICAPCD = Air Pollution Control District, Imperial County
SCAQMD = South Coast Air Management Quality District
ADEQ =Arizona Department of Environmental Quality

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-6**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-6
SONORAN DESERT REGION

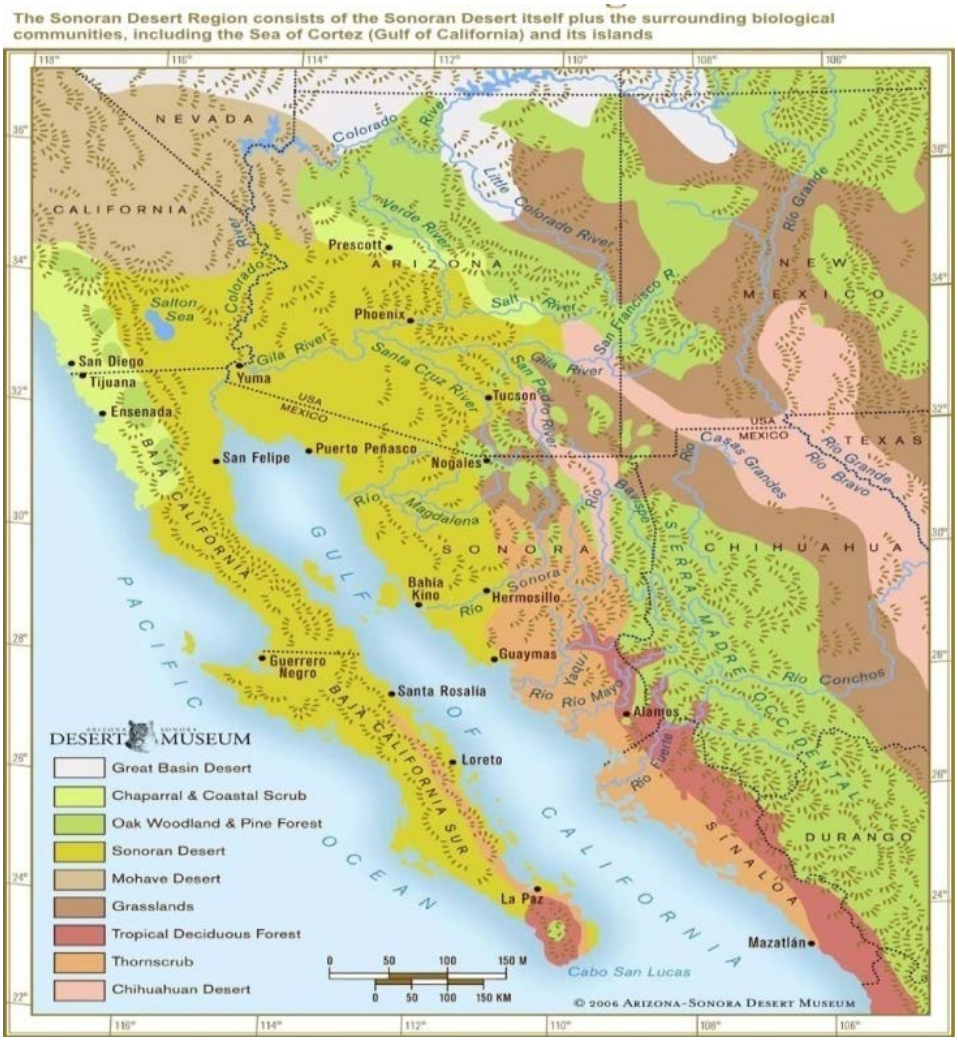

Fig 2-6: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region; the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated by the historical annual precipitation levels in Imperial County that average 3.11" (**Figure 2-7)**. During the 12-month period prior to April 12, 2014 and April 13, 2014, Imperial County measured total annual precipitation of 2.12 inches.

FIGURE 2-7
IMPERIAL COUNTY HISTORICAL WEATHER

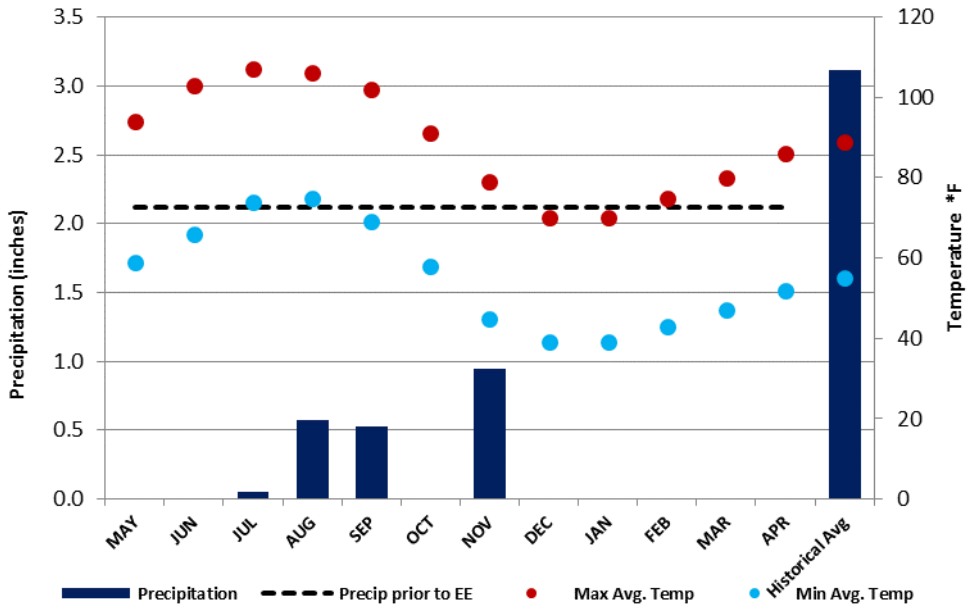

Fig 2-7: Prior to April 12, 2014 and April 13, 2014, the region had suffered abnormally low precipitation of 2.12 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Weather Underground, the California Observed Climate Normals, and the Western Regional Climate Center (WRCC)

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the

pressure gradient increases so does the speed of the wind.[2] Because the pressure gradient is simply the difference in pressure between the high and low-pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport dust over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for April 12, 2014 and April 13, 2014, caused by an upper-level trough of low-pressure, occurred as the system moved south across the Pacific northwest as early as April 11, 2014 through Saturday, April 12, 2014 increasing onshore gradients. As the upper level trough situated over the Great Basin moved through onshore flow weakened Sunday, April 13, 2014 but remained sufficiently strong during the early morning hours allowing gusty winds to prevail along the northern portion of the Coachella Valley.[3] The system brought pronounced onshore flow that resulted in strong, gusty westerly winds across the mountains and deserts.[4]

On April 12, 2014 and April 13, 2014, a passing low-pressure system caused gusty westerly winds to blow over and through the San Diego Mountains, over natural open desert areas and into Imperial County affecting air quality and causing an exceedance at the Niland and Brawley monitors.

Figures 2-8 and 2-9 provide information regarding the packing of the pressure gradient (strong onshore flow) and the wind speeds present over the region.

[2] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html
[3] Area Forecast Discussion National Weather Service San Diego CA 0430 PDT Sunday, April 13, 2014
[4] The Area Forecast Discussion by the San Diego National Weather Service implies the existence of two low-pressure systems. Area Forecast Discussion National Weather Service San Diego CA 0935 PDT Saturday, April 12, 2014

FIGURE 2-8
GOES E-W INFRARED SATELLITE IMAGES APRIL 12, 2014 - APRIL 13, 2014

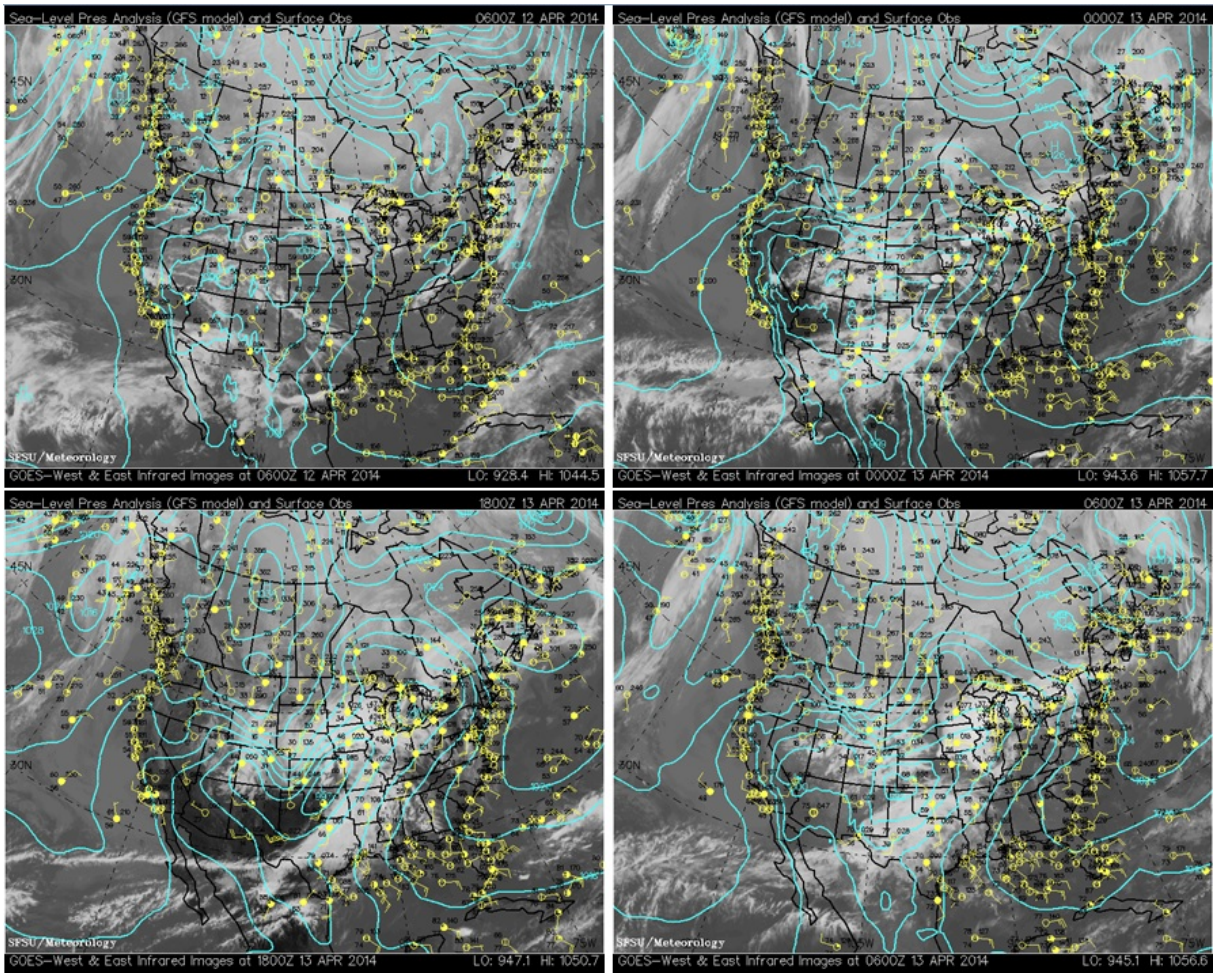

Fig 2-8: GOES-W & E infrared satellite images show the packing of pressure gradients as the system moved into the region. Clockwise from top left: 22:00 PST April 11, 2014; 16:00 PST April 12, 2014; 22:00 PST April 12; 10:00 PST April 13, 2014. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server

Sustained high winds started late on April 11, 2014 and continued through April 12, 2014 as the weather system moved over southeastern California. **Figure 2-9** shows wind barbs depicting the general direction and speed of winds over the region.

FIGURE 2-9
GOES-W VISIBLE SATELLITE IMAGES

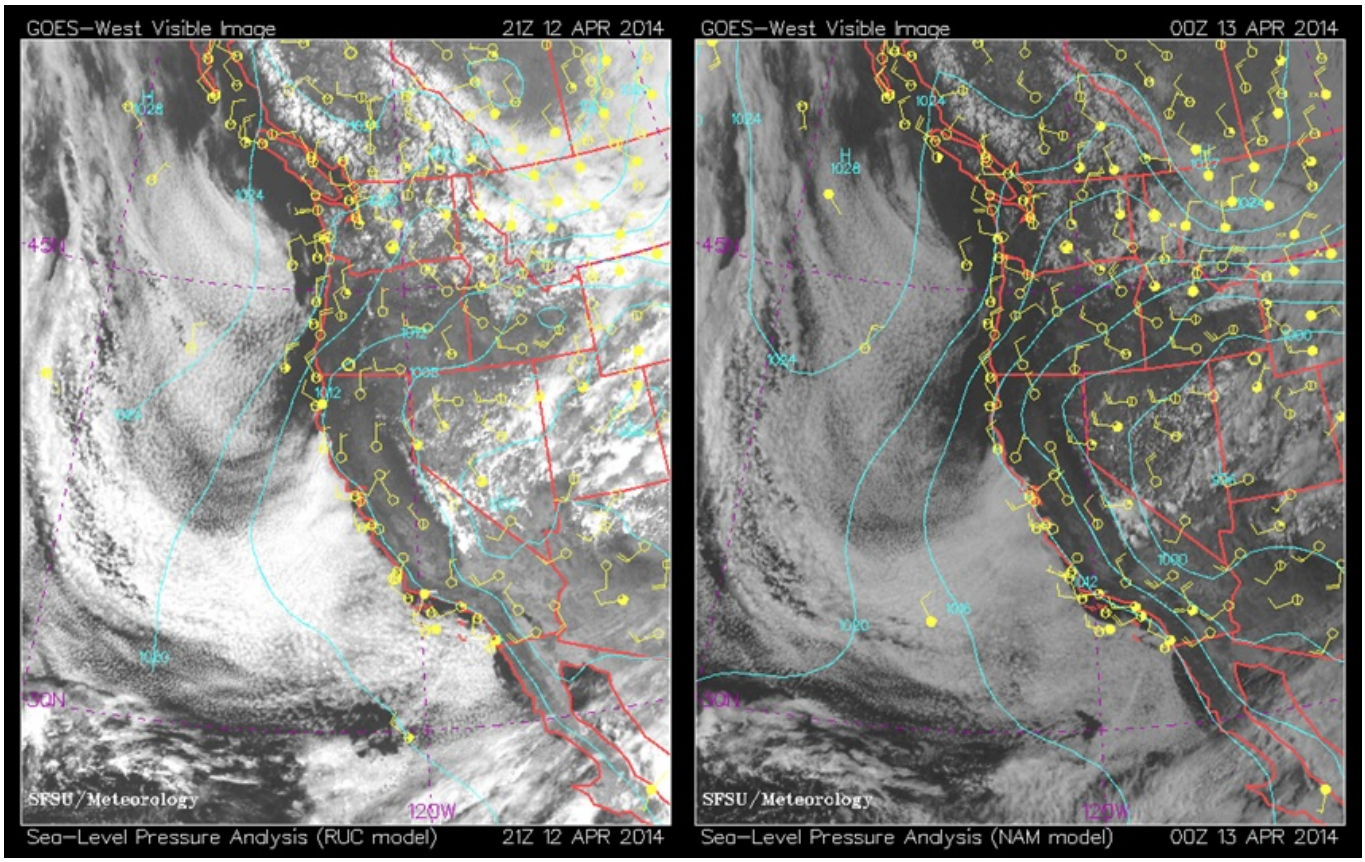

Fig 2-9: GOES-W visible sea-level pressure analysis composite satellite images provide a closer look at the tightening pressure gradient over the region, along with wind barbs depicting the general direction and speed of winds over southeastern California. As winds increased on April 12, 2014 both the Niland and Brawley, monitors had coincident elevated concentrations. April 12, 2014 at 13:00 PST (left) shows WSW wind barbs indicating wind speeds of 20 knots (23 mph). By 16:00 PST on April 12, 2014, the weather system moved eastward, increasing the packing of the pressure gradient closer over southeastern California. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server

The earliest discussion of the moving low-pressure trough is documented by the San Diego NWS in its 0200 PST (0300 PDT) Area Forecast for Friday, April 11, 2014. The subsequent issued Area Forecast discussions provide additional model information and descriptions that identify the approaching upper level low into the Southern California coast before moving inland late Friday, April 11, 2014 night through Saturday, April 12, 2014. The identified increase of onshore flow and associated gusty west winds caused the San Diego NWS to issue its first of five Urgent Weather messages, containing wind advisories for the San Diego Mountains, San Diego deserts and Coachella at 0235 PST (0335 PDT) Saturday, April 12, 2014. Each wind advisory identified potential winds 25 to 35 mph with gusts up to 55 mph and reduced visibility due to blowing sand and dust.

As winds continued elevating throughout the day, Saturday April 12, 2014, the San Diego NWS office issued its first of five Preliminary Local Storm reports.[5] The reports identified sustained winds as measured April 12, 2014 greater than 30 mph at Cathedral City, Cabazon, Julian, and Thousand Palms. The final report issued at 0142 PST (0242 PDT), Sunday April 13, 2014 identified sustained winds of 30 mph and 40 mph or greater at Cabazon. In addition, the San Diego NWS office identified the strongest measured wind gusts in several areas including Boulevard West (47 mph), Harrison Park (43 mph) and Ocotillo Wells (42 mph). As onshore flow slowly weakened, winds began to decrease below advisory levels, causing the San Diego NWS office to issue final Urgent Weather messages cancelling the wind advisories during the early morning hours of Sunday, April 13, 2014.

The NWS Phoenix office issued a zone forecast, on April 12, 2014, that forecasted westerly winds 20 to 30 mph, specifically during the afternoon, with possible gusts up to 35 mph in the evening. The forecast included reduced visibility due to patches of blowing sand and dust during the afternoon. The weather system affected an area from southeastern California including the Lower Colorado River Valley, eastward to southwest Maricopa and central Pinal counties in Arizona.

Early morning discussions by the San Diego NWS identified a trough of low pressure moving through the Great Basin during the early morning hours of April 13, 2014 with a high-pressure building over the Eastern Pacific. This caused dry Northwesterly flow to filter across Southern California as onshore gradients slowly weakened. As such, gusty west winds continued within the mountains and deserts of San Diego County through the morning and afternoon hours, albeit below advisory levels. However, as surface pressure gradients continued to transition from onshore to offshore along with the building of the high-pressure into the Great Basin northeast to east wind developed during the late evening hours on Sunday April 13, 2014 and into Monday. Although, the San Diego NWS office issued four Urgent Weather messages identifying northeast to east winds affecting the Coachella Valley, in Imperial County winds remained light on Monday, April 14, 2014.

Locally, both the Imperial County Airport (KIPL), and El Centro NAF (KNJK) measured elevated winds speeds and gust during the afternoon and evening hours of April 11, 2014 coincident with a shift in wind direction to the west. Wind speeds and gusts at KNJK measured higher than at KIPL between the hours of 1200 and 2300 PST. Winds continued to increase through the early morning hours of April 12, 2014 with KNJK measuring significantly higher winds speeds and gusts than KIPL. On April 12, 2014, KNJK measured 13 hours of gusts between 24 mph and 39 mph while KIPl measured 12 hours of gusts between 21 mph and 37 mph. Both airports measured the highest wind speeds during the afternoon to evening hours on April 12, 2014. Measured wind speeds ranged between 10 mph and 31 mph. By early morning hours of April 13, 2014, winds decreased to a moderate level and remained light to moderate the rest of the day coincident with a WNW shift in wind direction.

[5] Preliminary Local Storm Report National Weather Service San Diego CA 0844 PDT Saturday, April 12, 2014

FIGURE 2-10
RAMP UP ANAYLSIS APRIL 11, 2014 THROUGH APRIL 12, 2014

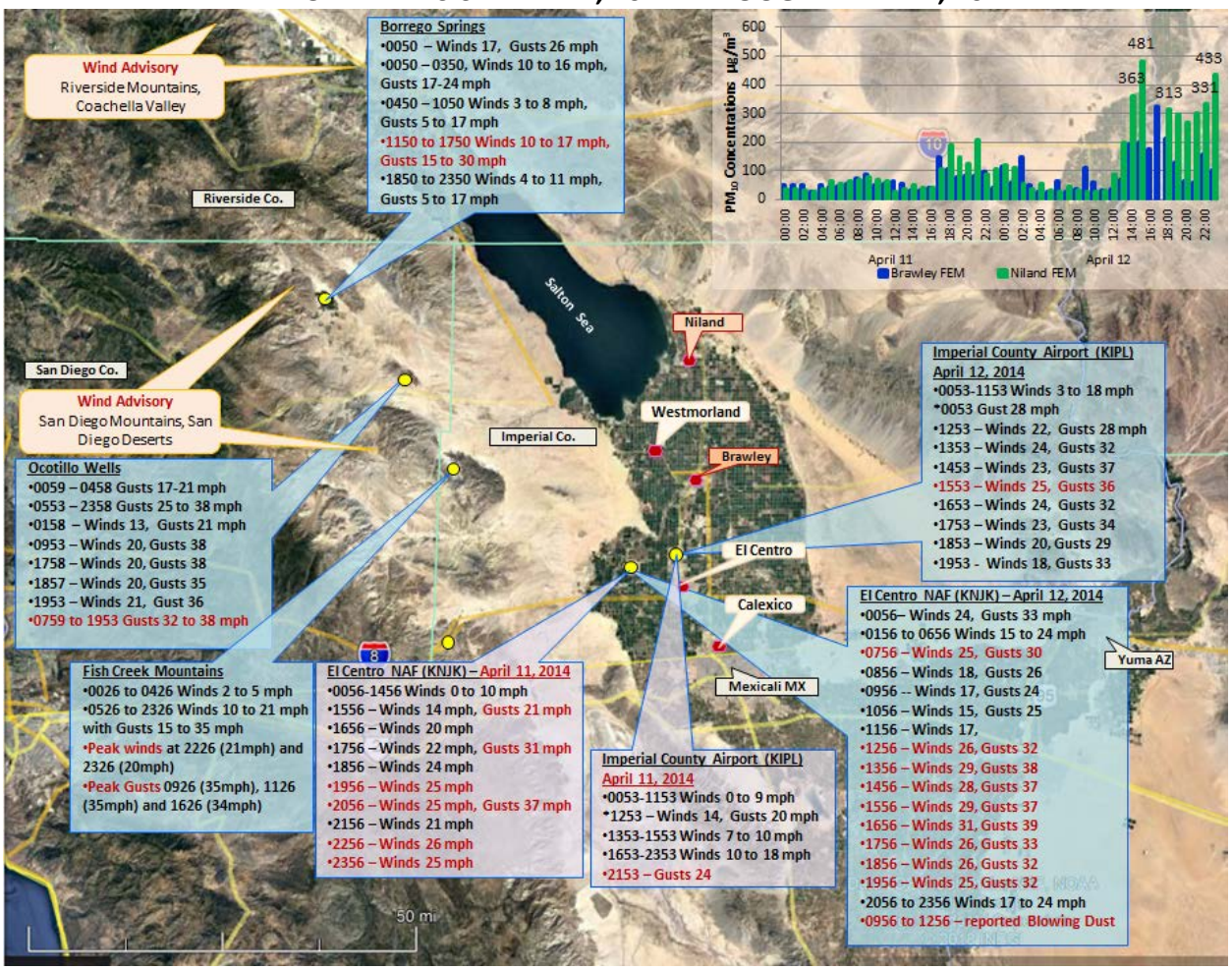

Fig 2-10: A shift in wind direction coincident with an increase in wind speed occurred as the weather system began to influence the region late April 11, 2014. By April 12, 2014, local airports measured winds up to 25 mph, with gusts up 39 mph. Wind data from NCEI QCLCD data bank. Niland wind data and PM_{10} data from EPA's AQS data bank. Background map from Google Earth

FIGURE 2-11
RAMP UP ANALYSIS APRIL 13, 2014

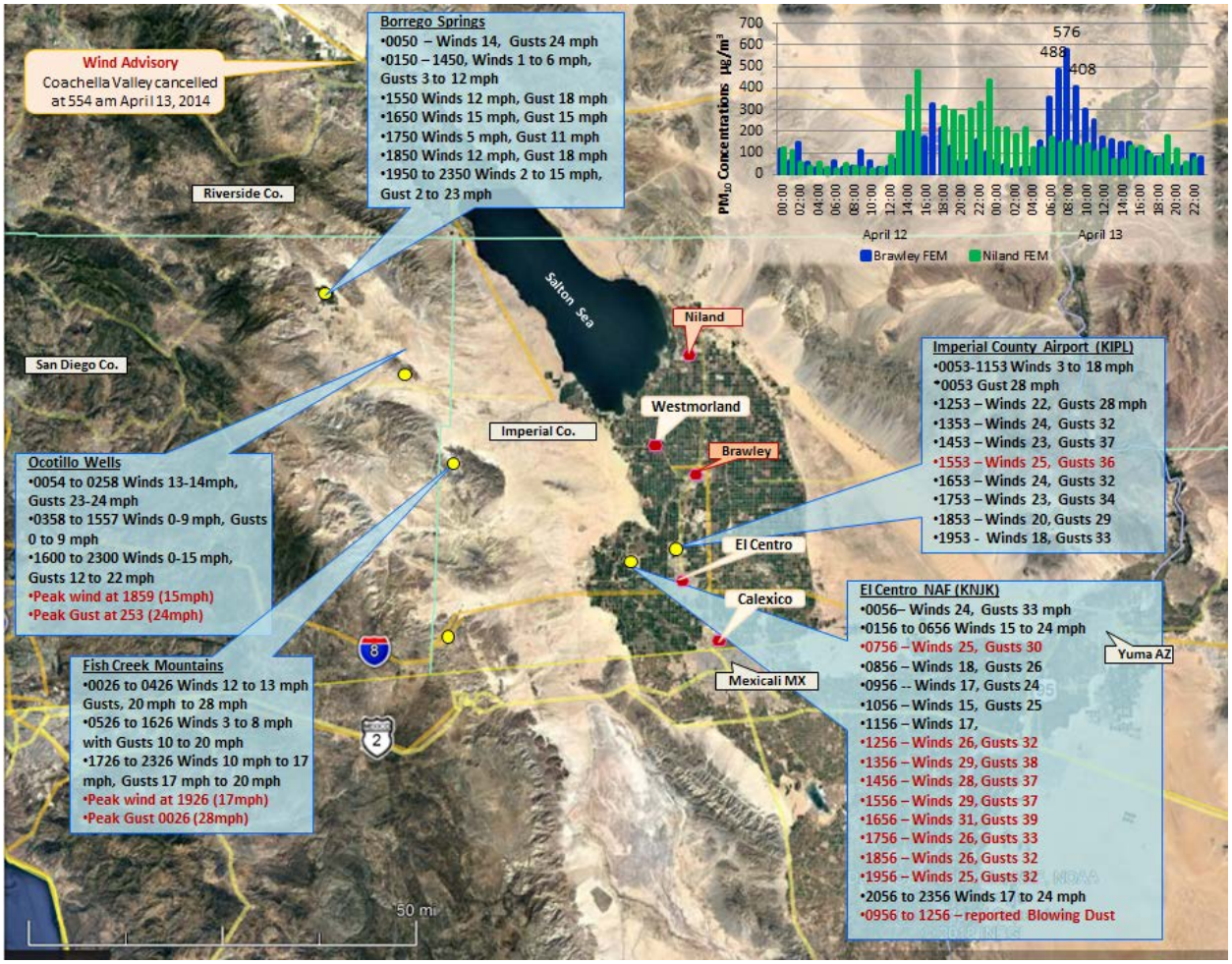

Fig 2-11: Wind direction shifted slightly to WNW on April 13, 2014. Although winds declined, there was enough residual dust in the air to cause an exceedance at Brawley. Wind data from NCEI QCLCD data bank. Niland wind data and PM_{10} data from EPA's AQS data bank. Background map from Google Earth

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON APRIL 12, 2014 AND APRIL 13, 2014

Station Monitor Airport Meteorological Data	Day	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed	
							Brly	Nlnd
IMPERIAL COUNTY								
Imperial Airport (KIPL)	12	25	240	15:53	37	14:53	199.8	481.5
	13	14	260	2:53	-	-	27.2	182.1
Naval Air Facility (KNJK)	12	31	240	16:56	39	16:56	174.5	-
	13	18	260	0:56	-	-	59.7	217.6
Calexico (Ethel St)	12	16.6	270	15:00	-	-	199.8	481.5
	13	7.1	300	19:00	-	-	92.8	176
El Centro (9th Street)	12	13.7	254	14:00	-	-	195	363.9
	13	6.9	284	2:00	-	-	27.2	182.1
Niland (English Rd)	12	21.4	244	16:00	-	-	174.5	-
	13	13.7	298	2:00	-	-	27.2	182.1
RIVERSIDE COUNTY								
Blythe Airport (KBLH)	12	22	230	18:52	28	18:52	213.5	313
	13	17	230	17:52	26	17:52	103.4	89.4
Palm Springs Airport (KPSP)	12	20.7	320	18:53	31.1	15:53	213.5	313
	13	16.1	340	16:53	20.7	9:53	117.3	127
Jacqueline Cochran Regional Airport (KTRM) - Thermal	12	25.3	340	16:52	34.5	20:52	174.5	-
	13	23	320	3:52	35.7	0:52	33.8	217.7
ARIZONA - YUMA								
Yuma MCAS (KNYL)*MST	12	20.7	280	17:57	21.9	14:57	323.6	-
	13	13.8	250	16:57	-	-	117.3	127
MEXICALI - MEXICO								
Mexicali Int. Airport (MXL)	12	20.7	260	15:48	-	-	199.8	481.5
	13	8.1	100	9:45	-	-	408.9	127.4

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models,[6] **Figures 2-12 through 2-14**, illustrate the path of airflow as it travelled from the mountains and natural open desert areas ending at 2300 PST, April 11, 2014, 1500 PST April 12, 2014 and 0800 PST April 13, 2014.

Figure 2-12 includes a 12-hour back-trajectory ending at 2300 PST on April 11, 2014. Airflow during the 12 hours ending at 2300 PST April 11, 2014 had a southwest to west direction for the

[6] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

Westmorland, Brawley, El Centro and Calexico monitors however, airflow at the Niland monitor approached from a southwest with an influence from a northwest direction. The back trajectory helps explain why the Niland monitor measured several hours of elevated concentrations during the evening hours of April 11, 2014, more so than the Brawley monitor did. Surface level airflow occurred only at the Niland monitor for approximately two (2) hours. On April 11, 2014 during the evening hours, surface level airflow allowed for the Niland monitor to measure six (6) hours of elevated concentrations of PM_{10} while upper level airflow at the Brawley monitor allowed for two (2) hours of elevated concentrations.

Figure 2-13 includes a 12-hour back-trajectory ending at 1500 PST on April 12, 2014 coincident with the measured peak hourly concentration at the Niland monitor. As mentioned above, elevated wind speeds, as measured at both local airports, allowed previously suspended dust to elevate concentrations at the Niland and Brawley monitors. While both the Niland and Brawley monitors measured 11 hours of elevated PM_{10} concentrations, the Niland monitor had surface level airflow longer than at the Brawley monitor resulting in higher averaged measured PM_{10} concentrations at the Niland monitor.[7] The combined suspended dust transported from the previous evening combined with a change of airflow allowed for transported dust to affect the Niland monitor much more significantly than the Brawley monitor.

Figure 2-14 includes a 12-hour back-trajectory ending at 0800 PST on April 13, 2014 coincident with the measured peak hourly concentration at the Brawley monitor. The path of airflow is distinctly from a northwest direction. Unlike the previous day, there existed long enduring surface level winds at all monitors. The surface level winds along with the suspended dust from the evening of April 11, 2014 and the suspended dust from April 12, 2014 allowed for elevated concentrations at the Niland and Brawley monitors. Although the Niland monitor measured 17 hours of elevated concentrations, the averaged measured concentration per hour remained below 217 $\mu g/m^3$. By contrast, the Brawley monitor measured 13 hours of elevated concentrations with six (6) of those hours at or above 250 $\mu g/m^3$. Combined with previously suspend dust, the airflow over the Salton Sea at surface levels would have allowed for less saltation and deposition at the Niland monitor accounting for lower level concentrations while the Brawley monitor surface level airflow over mountains and natural open desert areas accounts for the higher level concentrations.

It should be noted that the data used in the HYSPLIT model has a horizontal resolution of 12 km, and is integrated every three hours. Therefore, the overall pattern of airflow may differ from local observed surface wind speeds and directions.

[7] Two hours, 1600 and 1700, of measured PM_{10} concentrations at the Niland monitor did not meet critical criteria requirements, which caused an invalidation of the measured concentrations.

FIGURE 2-12
NOAA HYSPLIT BACK TRAJECTORY ENDING 2300 PST APRIL 11, 2014

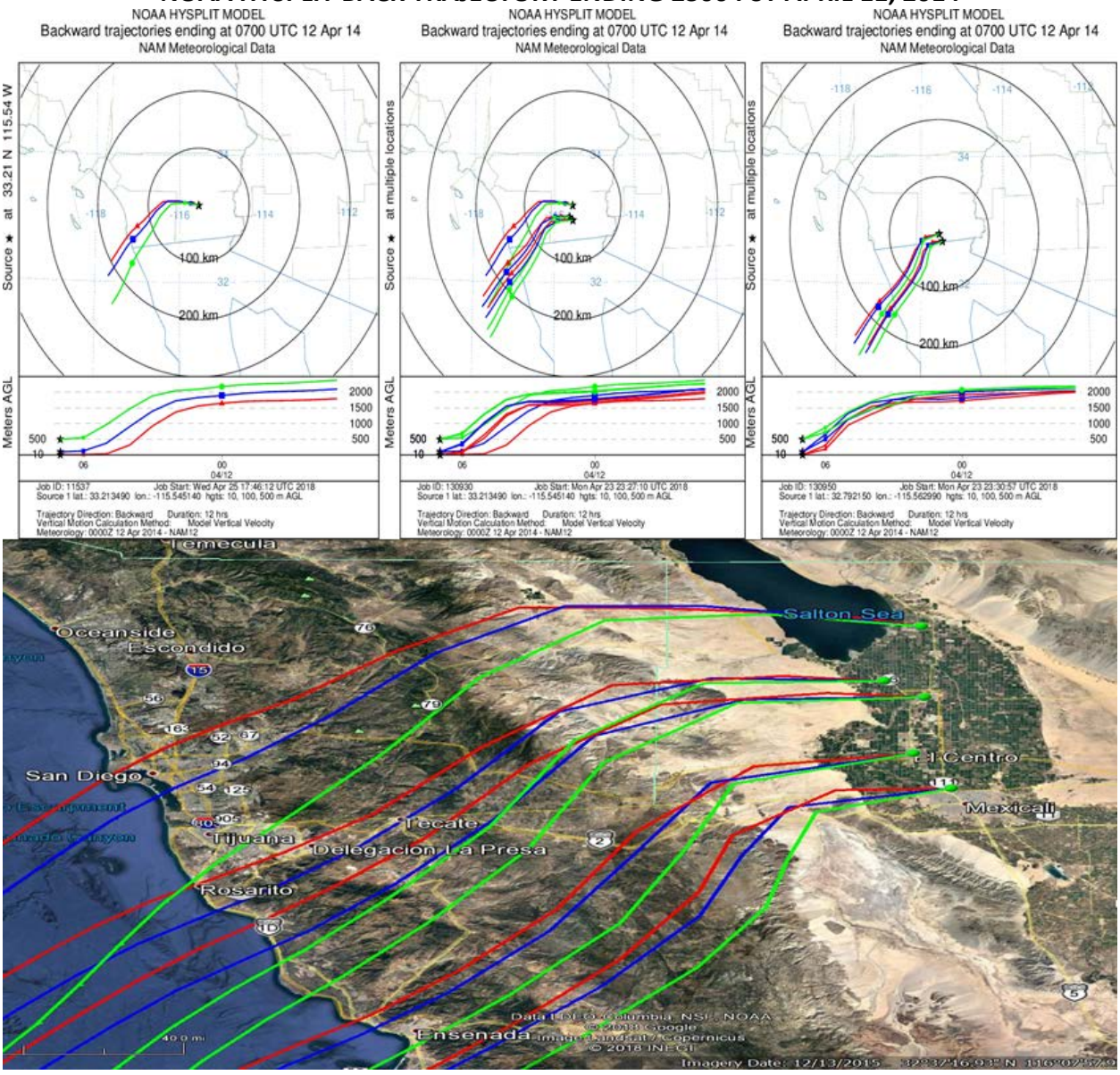

Fig 2-12: A 12-hour back trajectory ending at 2300 PST on April 11, 2014. The top left image is the back trajectory for Niland. The middle image is the back trajectory for Niland, Westmorland and Brawley. The top right image is the back trajectory for El Centro and Calexico. The image at the bottom is a base map of the same back trajectory for all the monitors. The airflow during the evening hours of April 11, 2014, coincident with elevated wind speeds had a southwest to west flow at the Westmorland, Brawley, El Centro and Calexico monitors. The airflow at the Niland monitor had a southwest to northwest flow over the Salton Sea. Red line indicates 10 meters AGL (above ground level); blue=100m; green=500 meters AGL. Generated through NOAA's Air Resources Laboratory

FIGURE 2-13
NOAA HYSPLIT TRAJECTORY ENDING 1500 PST APRIL 12, 2014

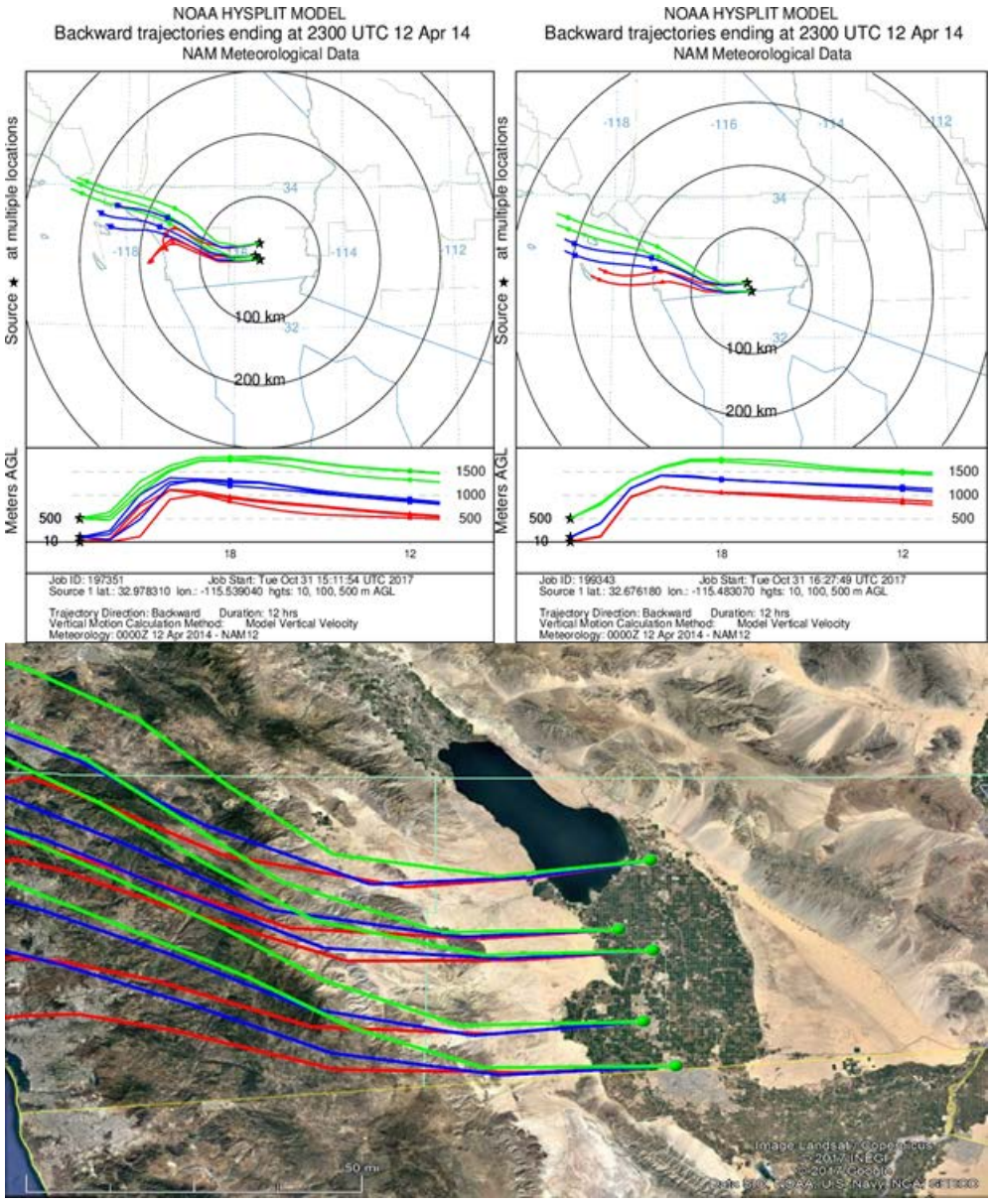

Fig 2-13: A 12-hour back trajectory ending at 15:00 PST on April 12, 2014 coincident with the peak hourly concentration measured at the Niland monitor illustrates airflow from a northwest to west direction. Red line indicates 10 meters AGL (above ground level); blue=100m; green=500 meters AGL. Generated through NOAA's Air Resources Laboratory

FIGURE 2-14
NOAA HYSPLIT TRAJECTORY ENDING 0800 PST APRIL 13, 2014

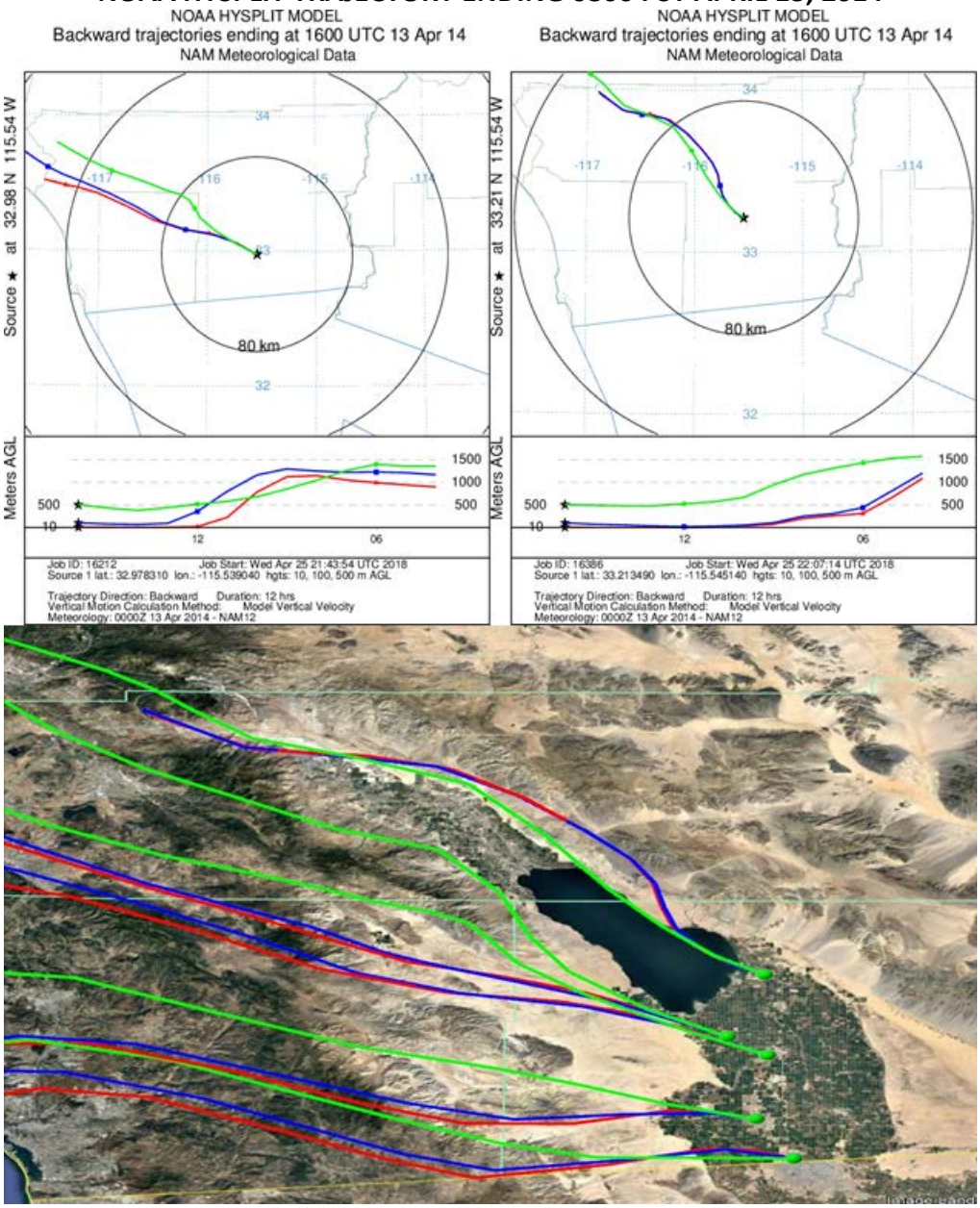

Fig 2-14: A 12-hour back trajectory ending at 0800 PST on April 13, 2014 coincident with the peak hourly concentration measured at the Brawley monitor illustrates airflow from a northwest direction. The top left image represents the Brawley monitor while the top right image represents the Niland monitor. The bottom image is a base map, which includes all the monitors. Red line indicates 10 meters AGL (above ground level); blue=100m; green=500 meters AGL. Generated through NOAA's Air Resources Laboratory

Figures 2-15 and 2-16 illustrate the elevated levels of wind speeds and hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma Counties.[8] As the weather system moved eastward into Arizona, the winds preceding the systems varied in direction on each given day. The upper level low-pressure passed through late April 11, 2014 through April 12, 2014. The elevated afternoon to evening winds on April 11, 2014 with a southwesterly flow, suspended particulates into the ambient air allowing for transport and deposition onto the Niland and Brawley monitors. On April 12, 2014, the day with the strongest measured winds, airflow had slight northwest influence but maintained a west direction, which allowed for continued deposition of transported dust particles onto the Brawley and Niland monitors. As the low-pressure system passed through the Great Basin on April 13, 2014, winds shifted to a predominant northwest direction and decreased to moderate levels allowing for deposition of previously suspended particles onto the Brawley and Niland monitors. On April 12, 2014 and April 13, 2014 wind direction and wind speed played a significant role in the amount of particles in the ambient air and the level of measured concentrations at each monitor.

FIGURE 2-15
96-HOUR PM_{10} CONCENTRATIONS AT REGULATORY SITES

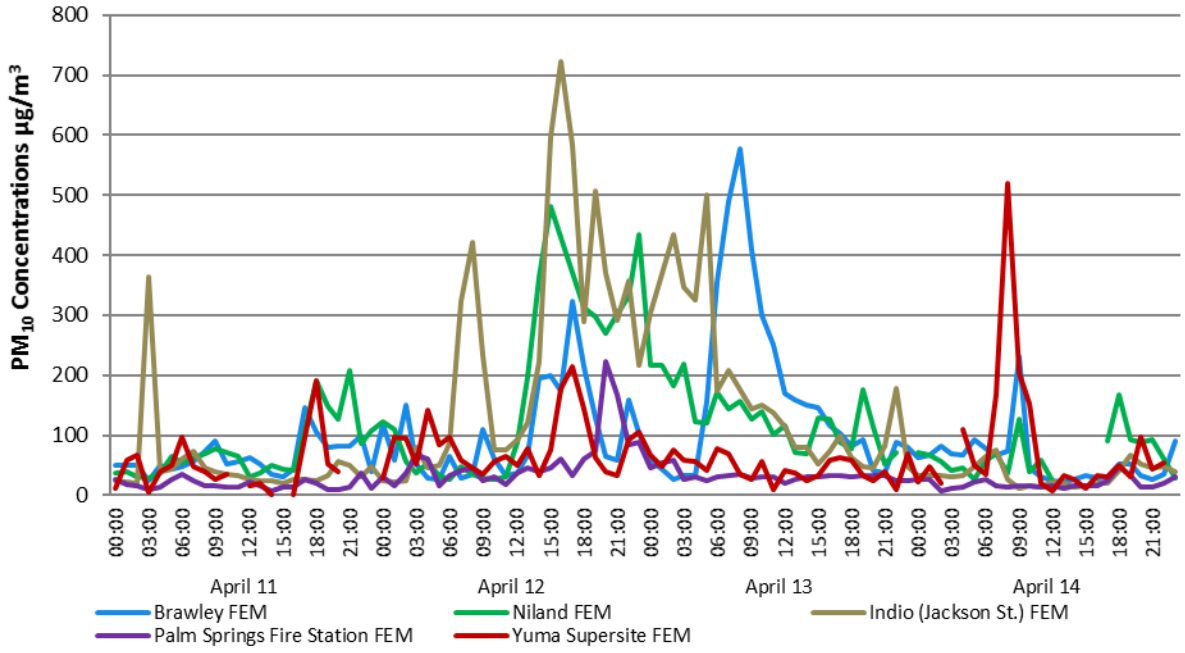

Fig 2-15: Stations throughout Riverside, Imperial, and Yuma counties experienced elevated PM_{10} levels during the wind event, particularly on April 12, 2014. Air Quality data from EPA's AQS data bank

[8] National Weather Service; NOAA's Glossary – Wind Speed: The rate at which air is moving horizontally past a given point. It may be a 2-minute average speed (reported as wind speed) or an instantaneous speed (reported as a peak wind speed, wind gust, or squall) http://w1.weather.gov/glossary/index.php?letter=w

FIGURE 2-16
96-HOUR WIND SPEEDS AT REGIONAL SITES

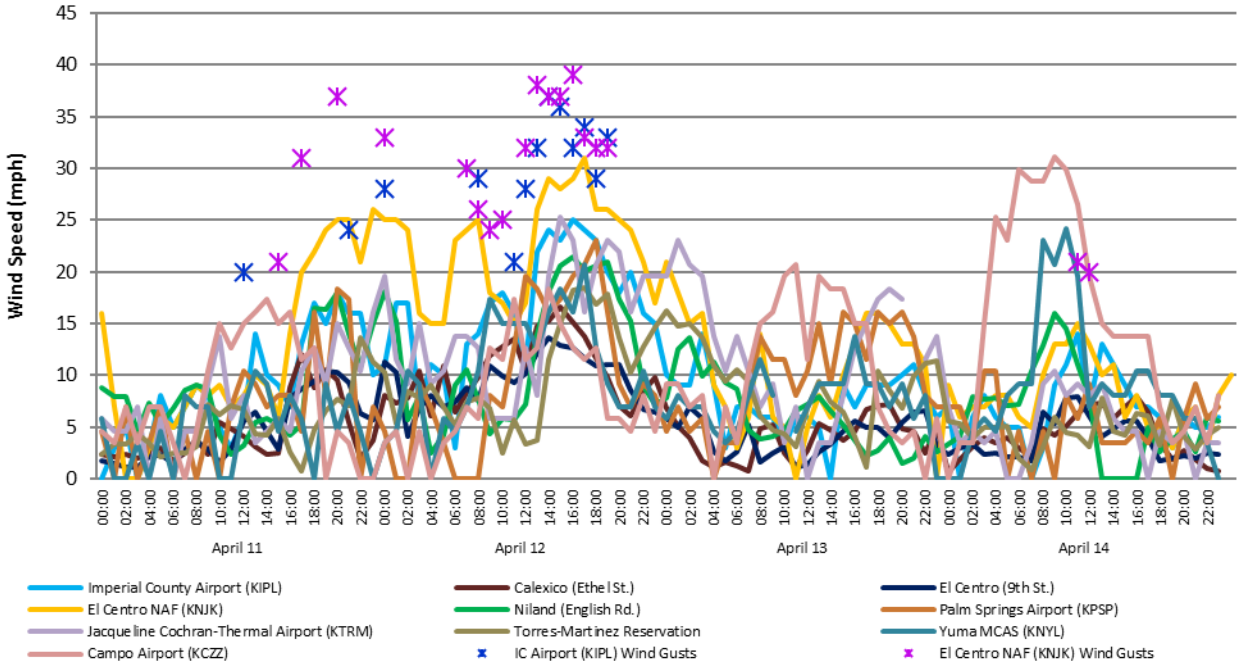

Fig 2-16: Stations throughout Riverside, Imperial, and Yuma counties experienced elevated wind speeds, particularly on April 12, 2014. Wind data from NCEI QCLCD and EPA's AQS data bank

III Historical Norm

III.1 Analysis

While naturally occurring high wind events may occur seasonally and at times frequently and qualify for exclusion under the EER, historical fluctuations of the particulate concentrations provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Niland and Brawley monitors on April 12, 2014 and April 13, 2014, respectively, were unusual and in excess of normal historical fluctuations.

Figures 3-1 through 3-3 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley and Niland monitors for the period of January 1, 2010 through April 13, 2014, for a total of 1,564 sample run days. Note that prior to 2013, the BAM data was not considered FEM and was not reported into AQS. In order to properly establish the intensity of the event, as it occurred on April 12, 2014 and April 13, 2014, 24-hour averaged PM_{10} concentrations were compiled and plotted as a time series, January 1, 2010 to April 13, 2014, to provide a historical perspective of PM_{10} concentrations.

FIGURE 3-1
NILAND HISTORICAL
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 13, 2014

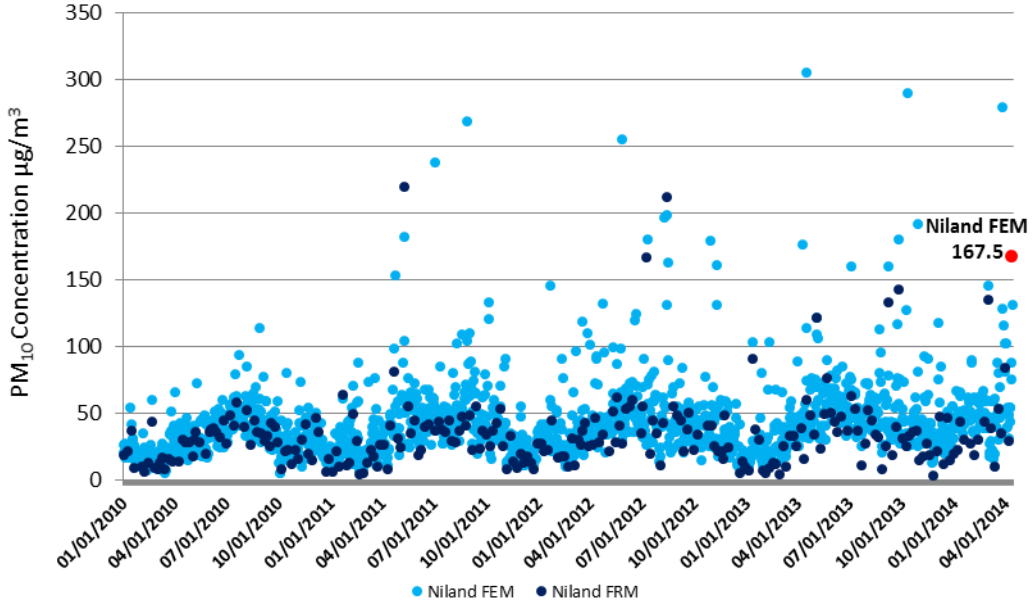

Fig 3-1: A historical comparison of PM_{10} concentrations demonstrates that the April 12, 2014 167 µg/m^3 measured concentration from the Niland BAM 1020 PM_{10} monitor was outside the normal historical measurement

FIGURE 3-2
BRAWLEY HISTORICAL
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 13, 2014

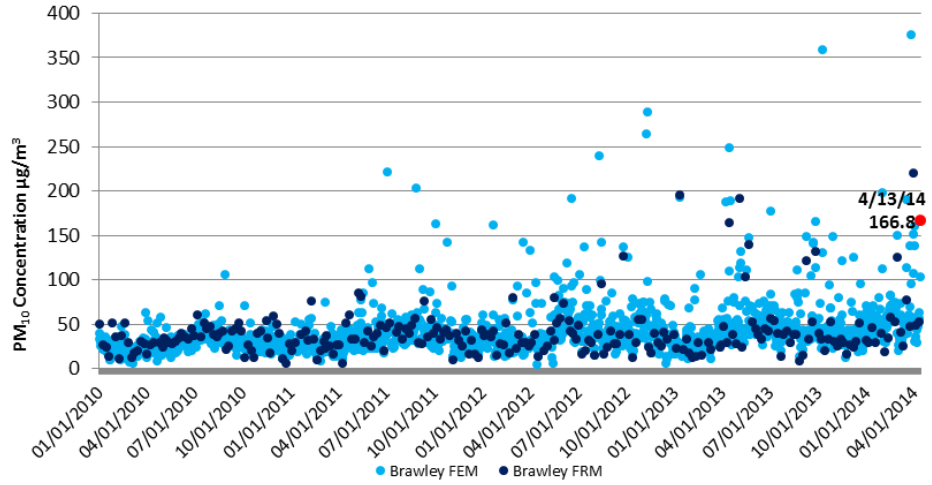

Fig 3-2: A historic comparison of PM_{10} concentrations demonstrates the April 13, 2014 166.8 µg/m^3 measured concentration from the Brawley BAM 1020 PM_{10} monitor was outside the normal historic measurements

FIGURE 3-3
BRAWLEY AND NILAND HISTORICAL
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 13, 2014

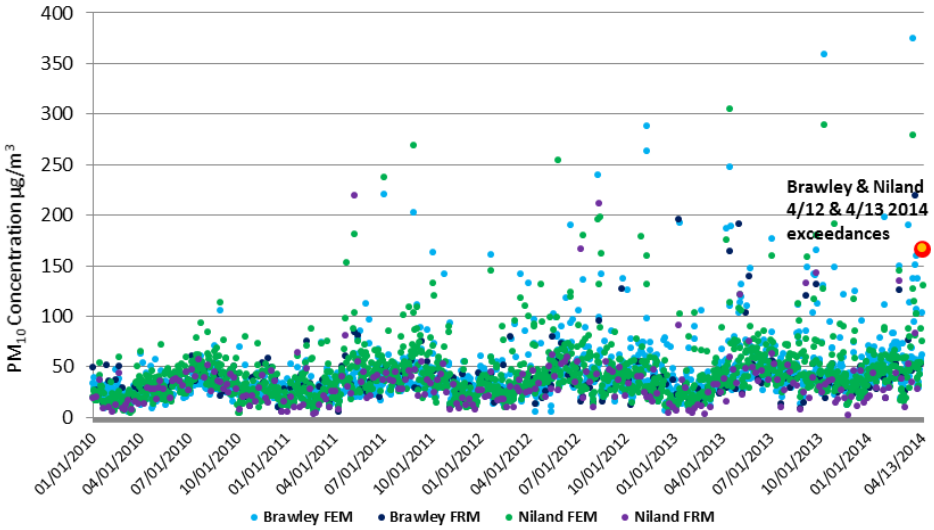

Fig 3-3: A historical combined comparison of PM_{10} concentrations for both Niland and Brawley demonstrates that the April 12, 2014 and April 13, 2014, measured concentrations of 167 µg/m^3 and 166.8 µg/m^3 were outside normal historical measurements

The time series, **Figure 3-3**, for Brawley and Niland includes 3,626 credible samples, measured by either FRM or FEM monitors between January 1, 2010 and April 13, 2014. During the period, January 1, 2010 through April 13, 2014 monitors measured 34 exceedances. That translates into just 0.94 percent of all credible samples. As mentioned above FEM BAM data was not considered regulatory from 2010 to 2012.

Figure 3-4 and **Figure 3-5** are individual seasonal graphs of the Brawley and Niland stations for the second quarter of April through June years 2010 through 2014. **Figure 3-6** combines Brawley and Niland seasonal FRM and FEM data for that same period, for a total of 873 credible samples. A total of 10 combined FRM & FEM exceedances occurred during the second quarter (April-June). That translates into just 1.15 percent of all credible samples during months April through June 2010 through 2014, ending April 13, 2014.

FIGURE 3-4
NILAND SEASONAL COMPARISON
PM_{10} 24-HR AVG CONCENTRATIONS
APRIL 1, 2010 TO APRIL 13, 2014

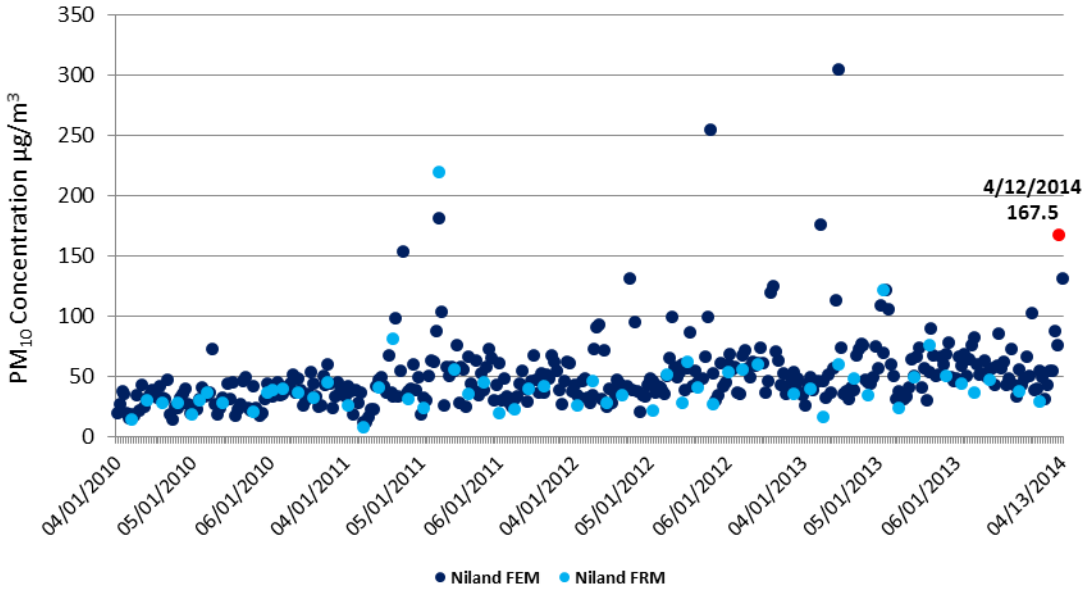

Fig 3-4: This shows seasonal fluctuations for months April through June 2010-2014, ending on April 13, 2014. The seasonal historical comparison supports that the measured exceedance at the Niland monitor on April 12, 2014 was outside the historical norm

FIGURE 3-5
BRAWLEY SEASONAL COMPARISON
PM_{10} 24-HR AVG CONCENTRATIONS
APRIL 1, 2010 TO APRIL 13, 2014

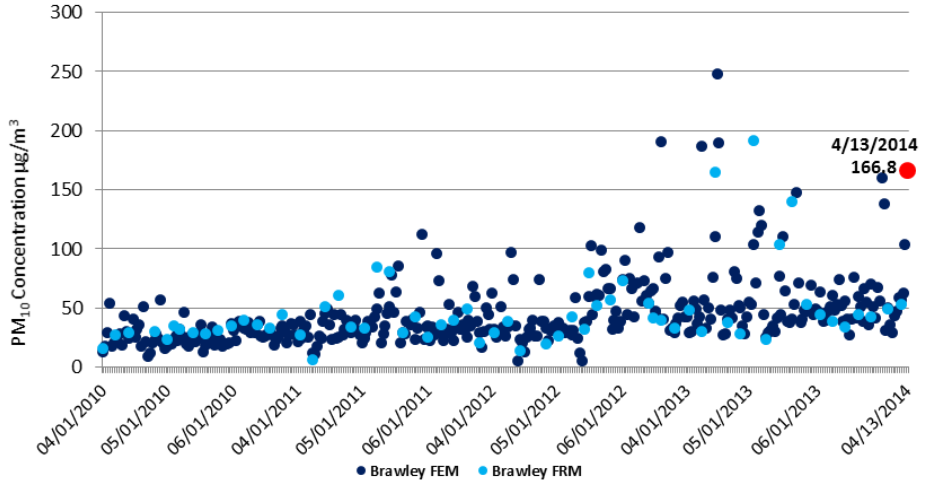

Fig 3-5: This shows seasonal fluctuations for months April through June, 2010-2014, ending on April 13, 2014. The seasonal historical comparison supports that the measured exceedance at the Brawley monitor on April 13, 2014 was outside the historical norm

FIGURE 3-6
BRAWLEY AND NILAND SEASONAL COMPARISON
PM_{10} 24-HR AVG CONCENTRATIONS
APRIL 1, 2010 TO APRIL 13, 2014

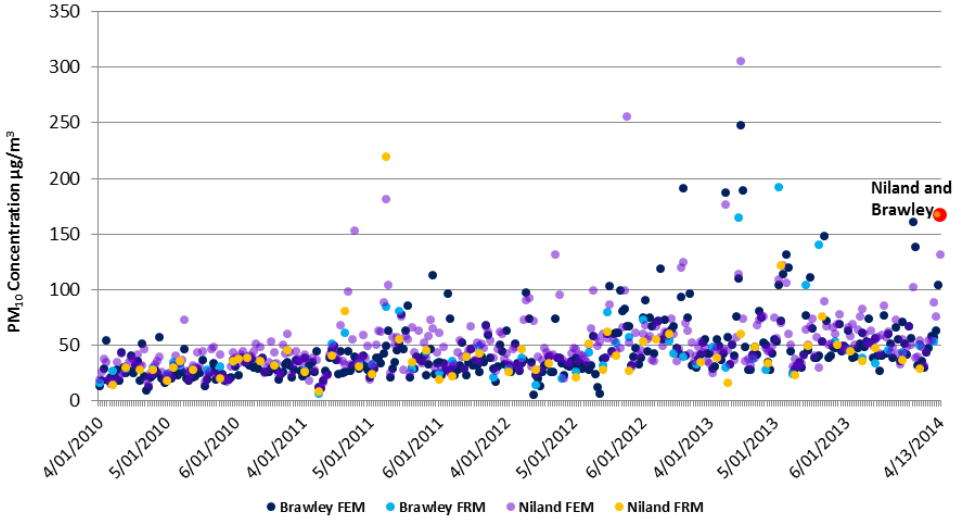

Fig 3-6: This shows seasonal fluctuations for months April through June, 2010-2014, ending on April 13, 2014. The seasonal historical comparison supports that the measured exceedances at the Niland and Brawley and monitors on April 12, 2014 and April 13, 2014, respectively, were outside the historical norm

Figures 3-7 and Figure 3-8 illustrate PM_{10} concentration fluctuations for Brawley and Niland on for both annual and seasonal periods between for the years 2010 through 2014. Both the Niland concentration of 167 µg/m^3 and the Brawley concentration of 166.8 µg/m^3 fell above the 98th percentile ranking.

FIGURE 3-7
BRAWLEY AND NILAND HISTORICAL
PM_{10} 24-HR FRM & FEM CONCENTRATIONS
JANUARY 1, 2010 TO JUNE 30, 2014

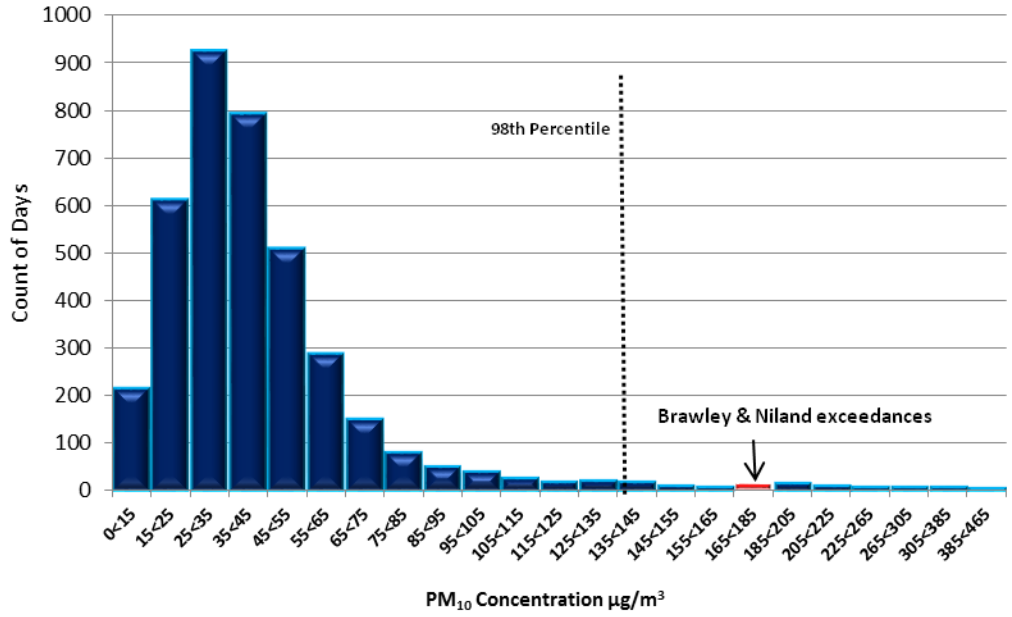

Fig 3-7: The 24-hr average PM_{10} concentrations measured at the Brawley and Niland monitoring sites demonstrates that the April 12, 2014 and April 13, 2014 events were in excess of the 98th percentile

FIGURE 3-8
BRAWLEY AND NILAND SEASONAL
PM_{10} 24-HR FRM & FEM CONCENTRATIONS
APRIL 1, 2010 TO JUNE 30, 2014

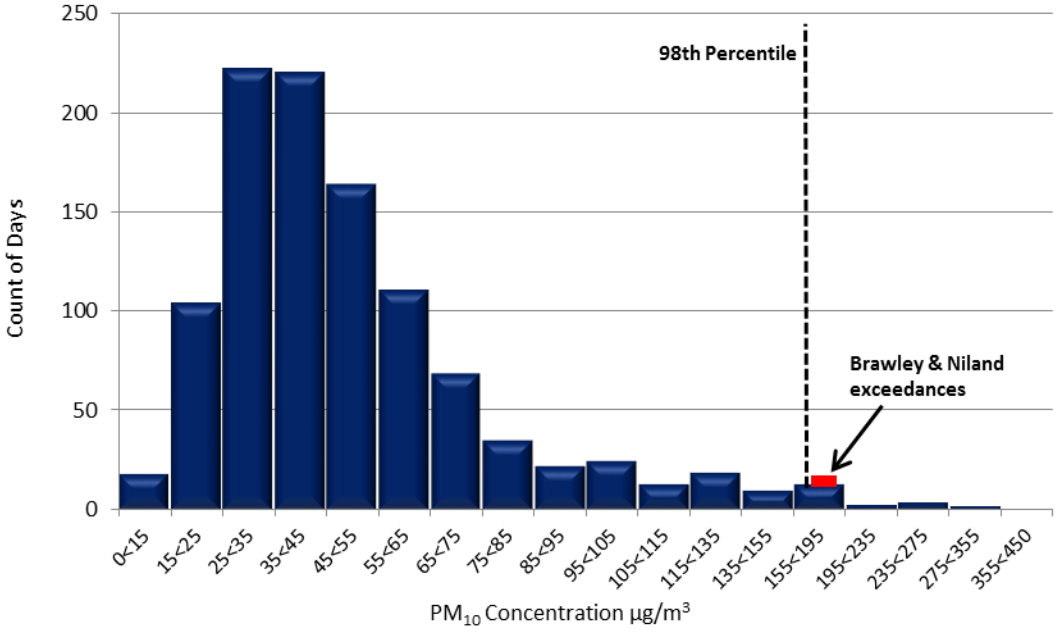

Fig 3-8: The 24-hr average PM_{10} concentrations measured at the Brawley and Niland monitoring sites demonstrates that the April 12 and April 13, 2014 events were in excess of the 98th percentile

III.2 Summary

The information provided by the time series plots and the percentile rankings illustrate that the PM_{10} concentrations observed on April 12 and April 13, 2014 occur infrequently. When comparing the measured PM_{10} levels on April 12 and April 13, 2014, and following USEPA EER guidance, this demonstration provides supporting evidence that the exceedances measured at the Niland and Brawley monitoring sites were outside the normal historical fluctuations. This historical concentration data and the demonstration found under the clear causal relationship supports that the measured exceedances on April 12 and April 13, 2014, was an exceptional event and that it affected air quality.

IV. Not Reasonably Controllable or Preventable

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute, which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006, ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

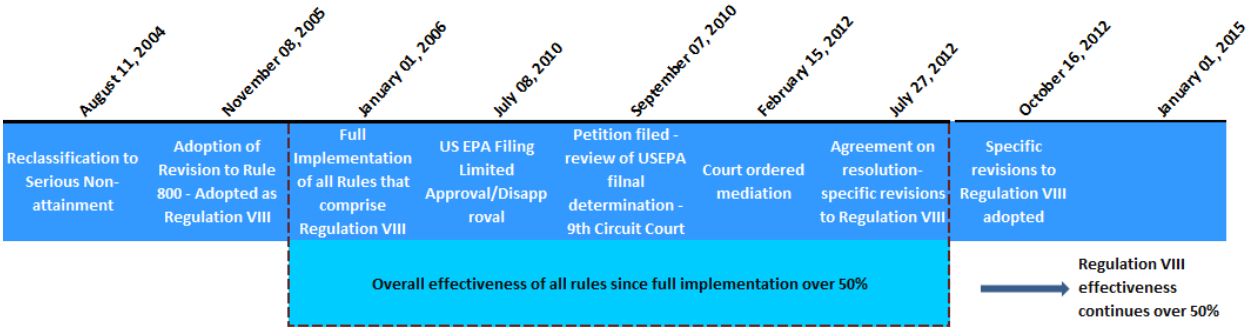

Fig. 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

A brief summary of Regulation VIII which is comprised of seven fugitive dust rules is found below. The complete set of rules can be found in **Attachment D**.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B of Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generate dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews hourly surface meteorological reports from various airport agencies, the NWS, state fire agencies, and CARB to help determine whether the day is a burn

day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On April 12, 2014, the ICAPCD declared a no burn day. April 13, 2014, was declared a limited burn day **(Appendix A).** No complaints were filed for agricultural burning on April 12, 2014 and April 13, 2014.

IV.1.c Review of Source-Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Niland and Brawley during the time of the April 12, 2014 and April 13, 2014 PM_{10} exceedance. An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. April 12, 2014 was officially designated as a no burn day. April 13, 2014 was a limited burn day. No complaints were filed on April 12, 2014 and April 13, 2014 related to agricultural or waste burning or fugitive dust.

IV.2 Forecasts and Warnings

The April 12, 2014 and April 13, 2014 weather event affected a wide area of the desert southwest. A zone forecast for Imperial County issued April 12, 2014 called for winds of 20 to 30 mph in the afternoon with gusts of 35 mph in the evening. The NWS Phoenix office issued a number of forecasts that predicted patches of blowing dust from high winds for a wide region including Imperial County in southeastern California, the lower Colorado River valley, and southwest Maricopa and north central Pinal counties in Arizona. A wind advisory for the Coachella Valley was issued April 12, 2014 at 2 a.m. through 2 p.m. with winds 20 to 30 mph and gusts up to 50 mph. A road in the Palm Springs area was closed on April 12, 2014 due to hazardous driving conditions brought on by blowing sand. **Appendix A** contains copies of the issued NWS forecasts and news articles concerning the wind event for April 12, 2014 and April 13, 2014.

AQI (air quality index) notices were issued by ICAPCD for Niland and Brawley stations on April 12, 2014 and April 13, 2014, respectively (see **Section V**). The web-based AQI notices on the ICAPCD webpage identified the AQI PM_{10} levels of 101-150 as “Unhealthy for Sensitive Groups.” The notices advised: “Although general public is not likely to be affected at this AQI range, people with lung disease, older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults and children are at greater risk from the presence of particles in the air.”

IV.3 Wind Observations

Wind data during the event were collected from airports and other sites relevant to the wind event in eastern Riverside County, southern San Diego County, southwestern Yuma County (Arizona), and Imperial County. Both Imperial County Airport (KIPL) and El Centro NAF (KNJK) Airport (KIPL) recorded winds of at least 25 mph. El Centro NAF recorded consecutive hours of

winds 25 mph or above with gusts up to 39 mph. Refer to **Appendix B** and **Table 2-2** for individual wind site graphs. Wind speeds of over 25 mph are normally sufficient to overcome most PM_{10} control measures. During the April 12, 2014 and April 13, 2014 event wind speeds were above the 25 mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that strong winds associated with an upper-level low pressure system caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements in the Niland, Brawley and surrounding areas to the north and south of Niland and Brawley during the event, were high enough (at or above 25 mph, with wind gusts over 35 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on April 12, 2014 and April 13, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. The April 12, 2014 and April 13, 2014 event can be considered an exceptional event under the requirements of the exceptional event rule.

V. Clear Causal Relationship

V.1 Discussion

Meteorological observations for April 12, 2014 and April 13, 2014, identified an upper-level low-pressure system that brought high westerly winds and gusts exceeding 35 mph across a large portion of southeastern California and the southwestern portion of Arizona. The gusty winds transported suspended dust from areas within the San Diego Mountains and deserts into Imperial County.

As discussed above, both local airports measured elevated wind speeds with the El Centro Naval Air Facility (NAF)(KNJK) measuring consistently higher than the Imperial County Airport (KIPL) on April 11, 2014 through April 13, 2014. Wind speeds, as reported by the San Diego NWS, observed elevated winds on April 12, 2014 greater than 30 mph at Cathedral City, Cabazon, Julian, and Thousand Palms with the strongest measured wind gusts along several areas including Boulevard West (47 mph), Harrison Park (43 mph) and Ocotillo Wells (42 mph). As onshore flow slowly weakened Sunday, April 13, 2014 and winds began to decrease below advisory levels the San Diego NWS office to issue final Urgent Weather message cancelling the previously issued wind advisories. Similarly, the NWS Phoenix office issued a zone forecast, on April 12, 2014, that forecasted westerly winds 20 to 30 mph, specifically during the afternoon, with possible gusts up to 35 mph in the evening. The forecast included reduced visibility due to patches of blowing sand and dust during the afternoon.

Entrained windblown dust from natural open areas, particularly from the desert area and anthropogenic sources controlled with BACM, is verified by the meteorological and air quality observations on April 12, 2014 and April 13, 2014. Meteorological data show that these gusty westerly winds blew across the San Diego mountain slopes and natural open deserts were directly responsible for the high PM_{10} concentrations observed in Imperial County on April 12, 2014 and April 13, 2014.

Figure 5-1 provides a visual illustration of the packing of the pressure gradient resulting in gusty westerly winds.

FIGURE 5-1
GOES INFRARED SATELLITE COMPOSITE IMAGES

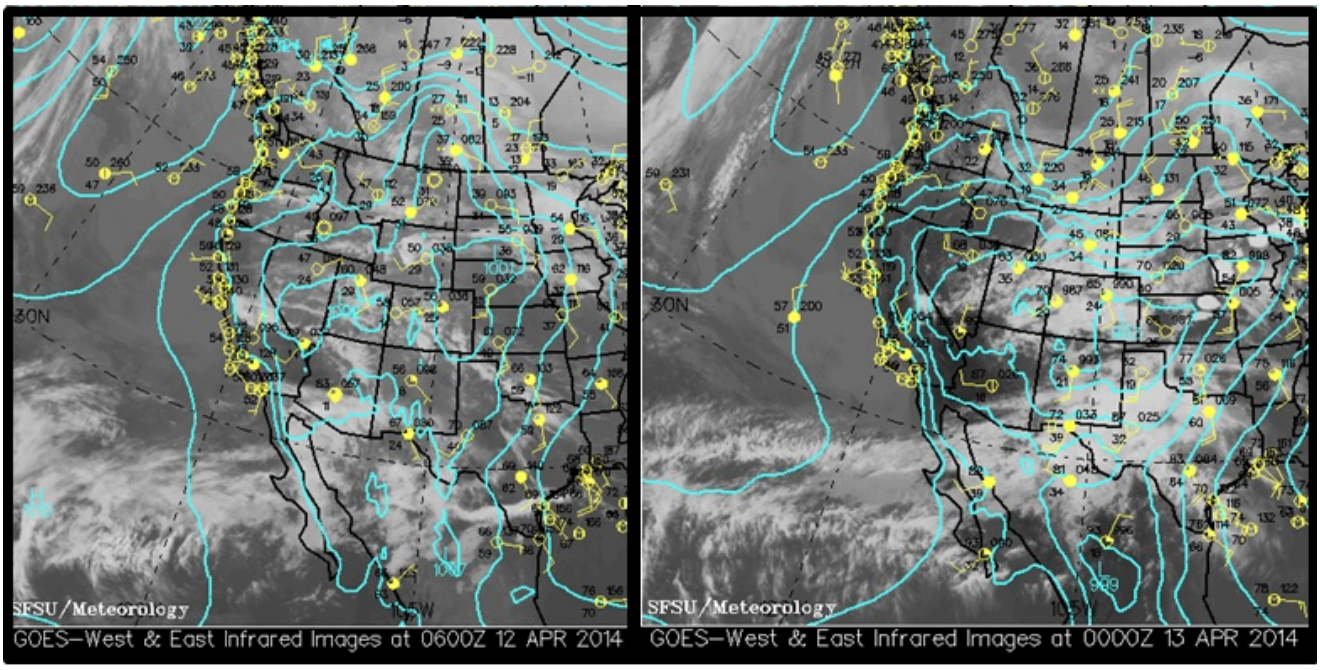

Fig 5-1: Surface analysis composite maps from a GOES E-W satellite (left) and a GOES-W satellite (right). The left image shows pressure gradients packing at 10:00 PST April 11, 2014 (0600Z April 12, 2014). This was during the time when Imperial County Airport and El Centro NAF measured an increase in wind speed and sporadic gusts. The right image at 16:00 PST April 12, 2014 (0000Z April 13, 2014) is during the period when winds were at their strongest

Any discussion of the exceedance that occurred at the Niland and Brawley monitors on April 12, 2014 and April 13, 2014 must include a brief discussion of the April 11, 2014 winds. The earliest discussions of the moving low-pressure trough and its subsequent movement inland by the San Diego NWS identify the approaching upper level low into the Southern California coast late Friday, April 11, 2014 night through Saturday, April 12, 2014. The identified increase of onshore flow and associated gusty west winds and the analysis of the HYSPLIT back-trajectory for April 11, 2014 (**Figure 2-12**) identified a southwest to west airflow except at the Niland monitor where there exited a slight northwest influence. On April 11, 2014 during the evening hours, surface level airflow allowed for the Niland monitor to measure six (6) hours of elevated concentrations of PM_{10} while upper level airflow at the Brawley monitor allowed for two (2) hours of elevated concentrations.

Although the Brawley station does not measure wind speeds earlier discussions indicated that local airports, such as the Imperial County Airport (KIPL) measured elevated winds during the evening hours of April 11, 2014. KIPL measured its highest winds between 1653 PST and 2353 PST (11mph to 18mph). Similarly, the Niland station measured its highest wind speeds between

the hours 1800 PST and 2300 PST (10mph to 18mph) coincident with elevated measured concentrations on April 11, 2014. Neither monitor measured an exceedance on April 11, 2014.

Winds continued to increase throughout the day on Saturday, April 12, 2014 with local airport measuring several hours at or above 25mph. Along with the increase in wind speeds a shift in airflow to a predominant northwest, west direction allowed for both the Niland and Brawley monitors to measure 11 hours of elevated concentrations of PM_{10}. Much like the previous day, the Niland monitor had surface level airflow for a longer time than at the Brawley monitor. Combined with the already existing suspended dust from the previous day and the longer surface level airflow at the Niland monitor allowed for higher averaged hourly measured concentrations of PM_{10} at the Niland monitor on April 12, 2014 than at the Brawley monitor, which resulted in an exceedance only at the Niland monitor.

As the trough of low-pressure moved through the Great Basin during the early morning hours of April 13, 2014 with a high-pressure building over the Eastern Pacific dry Northwesterly flow filtered across Southern California as onshore gradients slowly weakened. Gusty west winds remained moderate, sufficient to allow previously transported dust to affect the Niland and Brawley monitor. Unlike the previous day, not only did the path of airflow on April 13, 2014 have a distinctly northwest direction, long enduring surface level winds affected all the monitors. With the existing suspended dust from the two previous days and the shift to a predominant northwest airflow, the Brawley monitor measured higher averaged hourly averaged concentrations of PM_{10} than Niland. Although Niland measured 17 hours of elevated concentrations compared to Brawley's 13 hours, the average hourly concentration for Niland measured lower. Because longer surface level airflow from a predominately-northwest direction affected the Niland monitor, less saltation and deposition occurred when those surface level winds blew over the Salton Sea causing lower average hourly concentrations of PM_{10}. In any event, transported windblown dust from the mountains and natural open desert areas northwest of the Brawley monitor caused an exceedance on April 13, 2014.

Figures 5-2 and 5-3 are graphical representations of the meteorological conditions existing April 12, 2014 and April 13, 2014 as transported windblown dust entered Imperial County affecting air quality and causing an exceedance at the Niland and Brawley monitors.

FIGURE 5-2
EXCEEDANCE TIMELINE FOR APRIL 12, 2014

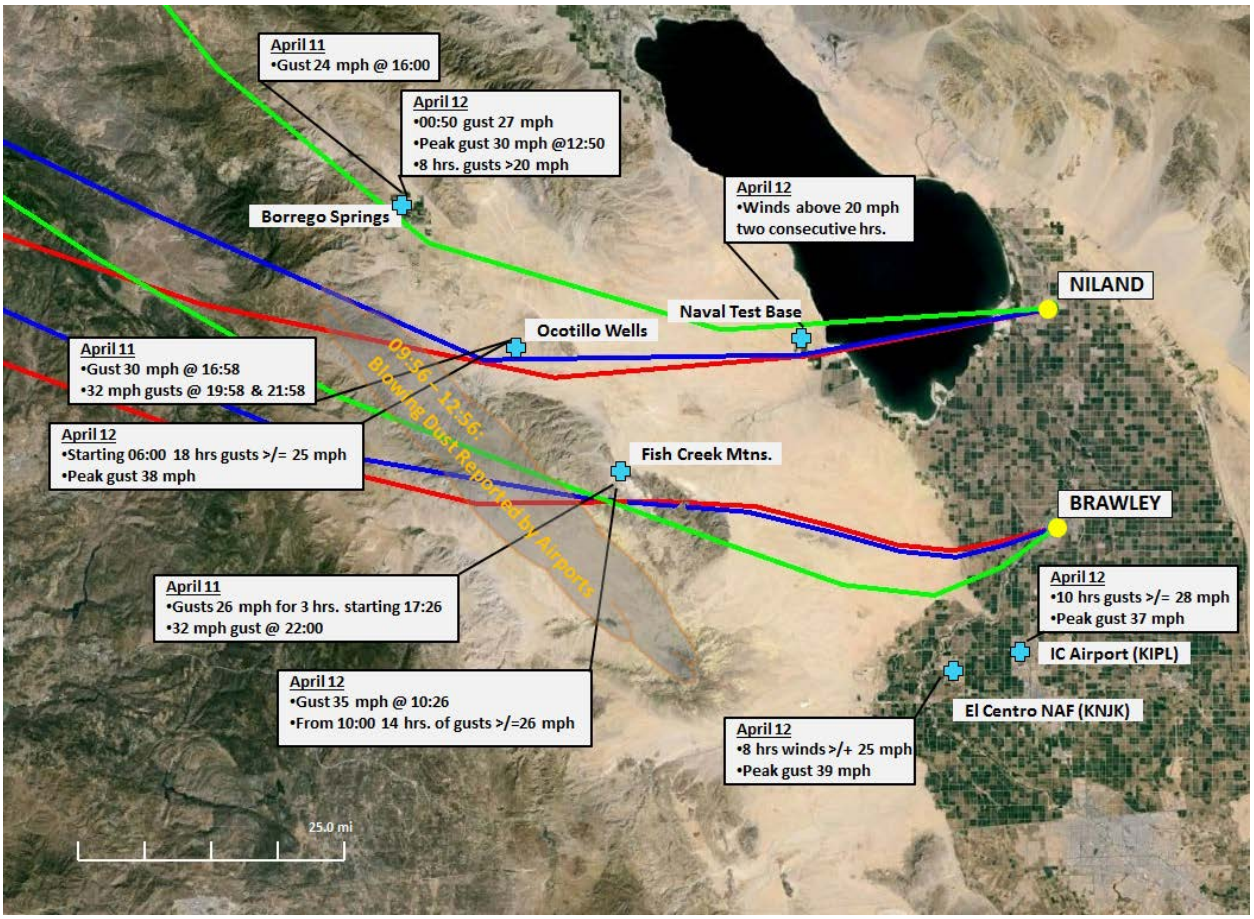

Fig 5-2: A 12-hour back trajectory ending at Niland and Brawley at 15:00 PST on April 12, 2014 coincident with the measured peak hourly concentration at Niland. Red line indicates 10 meters AGL (above ground level); blue=100m; green=500 meters AGL. Generated through NOAA's Air Resources Laboratory

FIGURE 5-3
EXCEEDANCE TIMELINE FOR APRIL 13, 2014

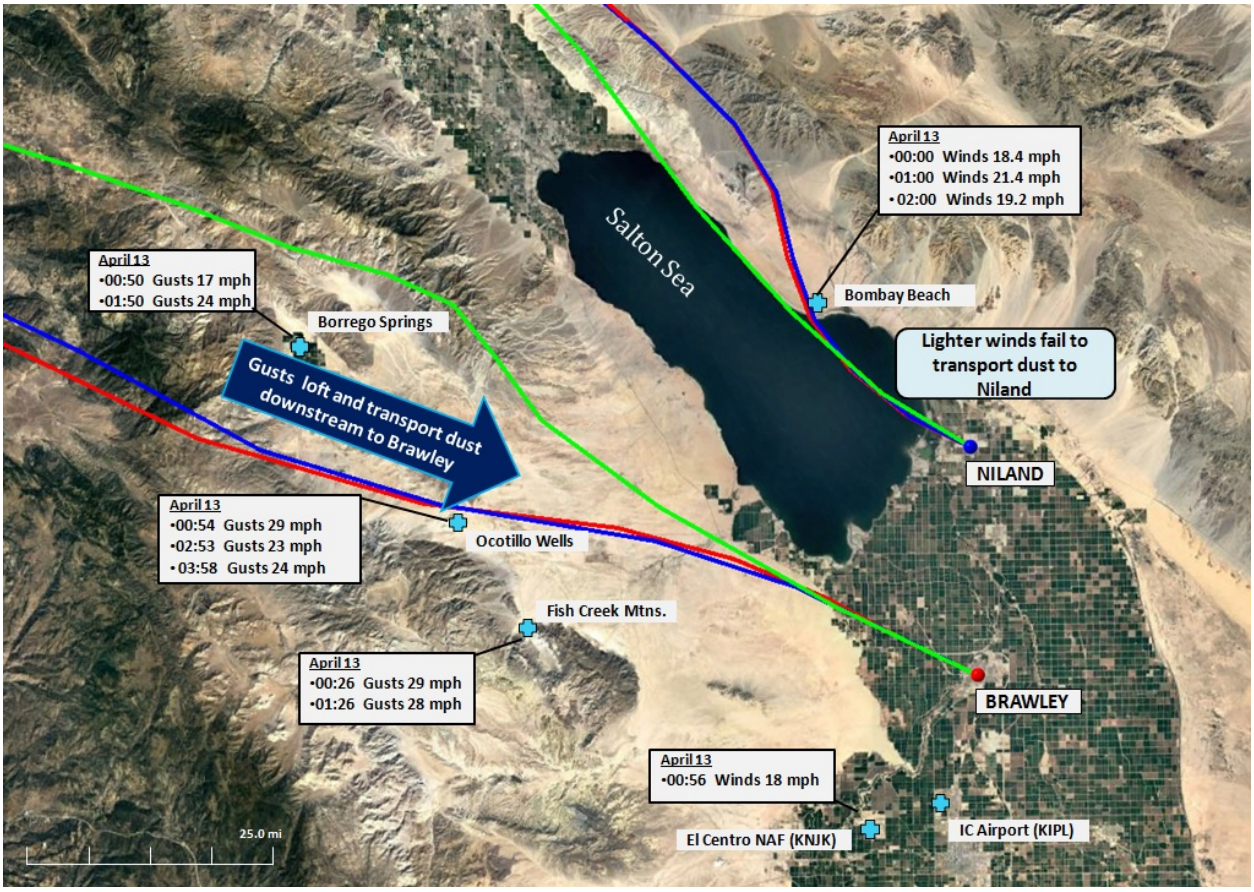

Fig 5-3: A 12-hour back trajectory ending at Brawley & Niland at 08:00 LST on April 13, 2014 coincident with the measured hourly peak concentration at the Brawley monitor on April 13, 2014. Red line indicates 10 meters AGL; blue=100m; green=500 meters AGL. Generated through NOAA's Air Resources Laboratory

Figures 5-4 through 5-9 demonstrate the temporal relationship between the gusty winds and the transported windblown dust and resulting effect upon air quality in Imperial County. The positive correlation of measured PM_{10} concentrations at air monitors in Imperial County and specifically at the Brawley and Niland monitors and the elevated wind speeds on April 11, 2014 through April 13, 2014, indicate that as wind speeds increased so did concentrations of PM_{10}. Please note that meteorological sites within the San Diego Mountains and the El Centro NAF measured wind speeds at or above 25 mph.

The elevated hourly PM_{10} concentrations occurred throughout the day coincident with the associated gusty winds as measured at the different stations in Imperial and San Diego Counties. **Appendix C** contains additional graphs illustrating the relationship between the high PM_{10} concentrations and increased wind speeds from other monitoring sites within Imperial, Riverside, and Yuma counties on April 12, 2014 and April 13, 2014**.**

FIGURE 5-4
96-HOUR UPSTREAM WIND SPEEDS

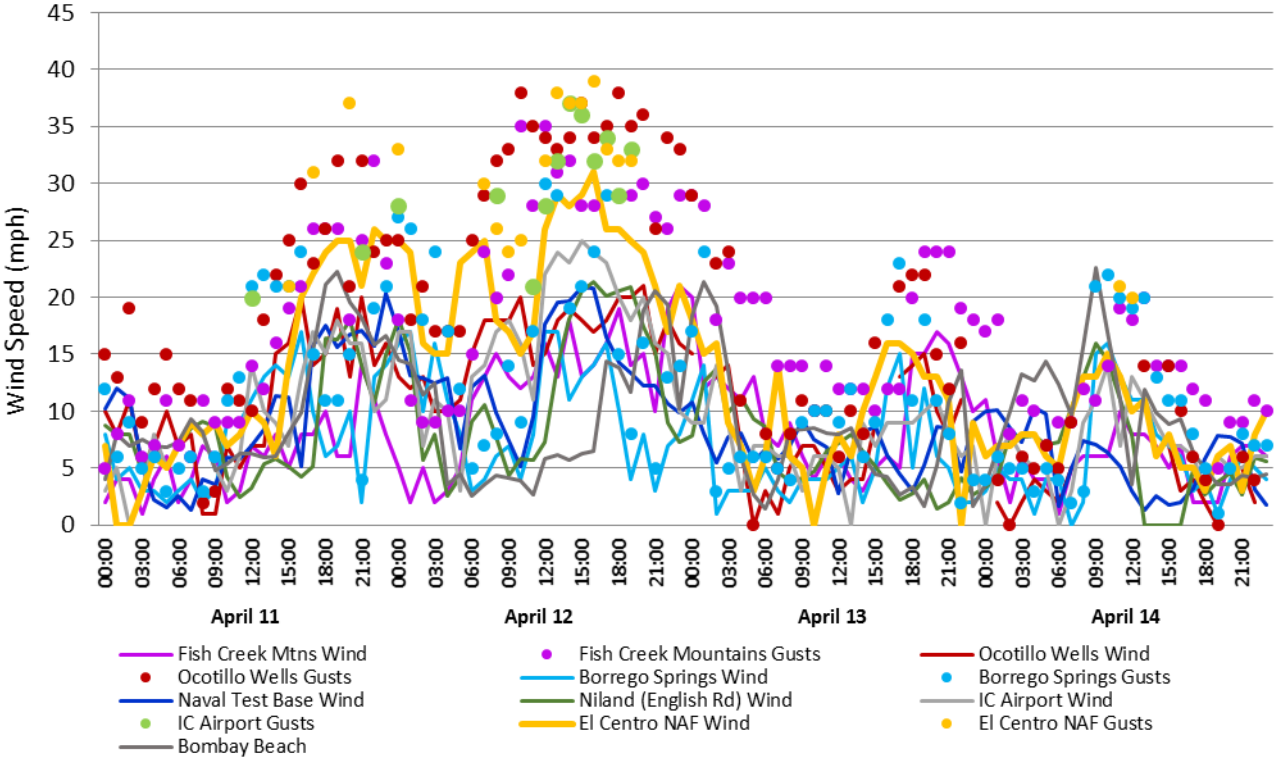

Fig 5-4: Wind data from NCEI's QCLCD data bank, EPA's AQS data bank, and the University of Utah's MesoWest data bank

FIGURE 5-5
NILAND PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

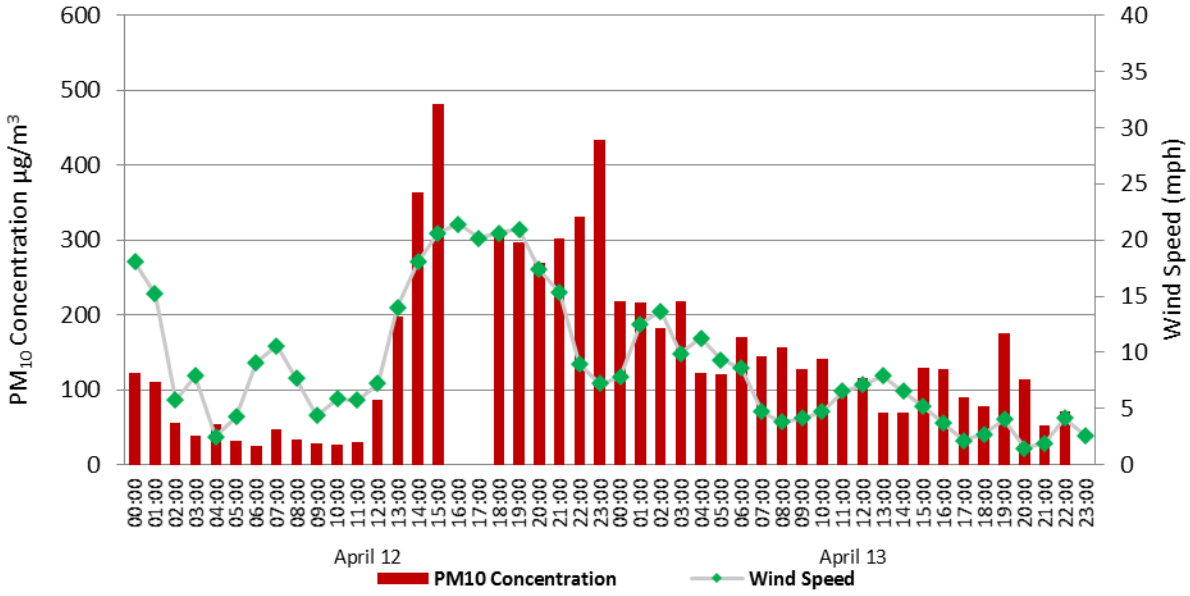

Fig 5-5: Niland PM_{10} concentrations show a correlation between increases in winds and concentrations of PM_{10}. Air Quality data and wind data from the EPA's AQS data bank. Wind data from NCEI QCLCD and EPA's AQS data bank

FIGURE 5-6
BRAWLEY PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

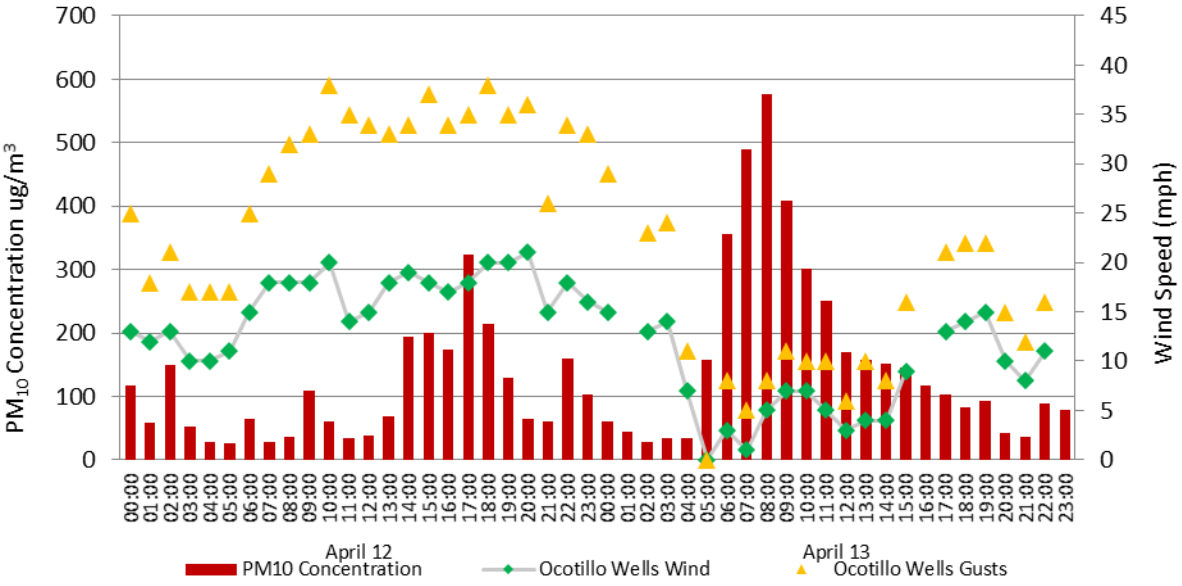

Fig 5-6: Although wind speeds decreased, the winds remained sufficiently strong enough to allow already transported dust to affect the Brawley monitor. Ocotillo Wells was most directly upstream to Brawley on April 13, 2014. Air Quality data from the EPA's AQS data bank. Wind data from University of Utah's MesoWest data bank

Figure 5-7 contrasts observed visibility at El Centro NAF (KNJK) and regional PM_{10} concentrations. Shortly after minimum visibility, both Niland and Brawley FEM monitors measured elevated levels of PM_{10}.

FIGURE 5-7
96-HOUR PM_{10} CONCENTRATIONS AND VISIBILITY
EL CENTRO NAF (KNJK)

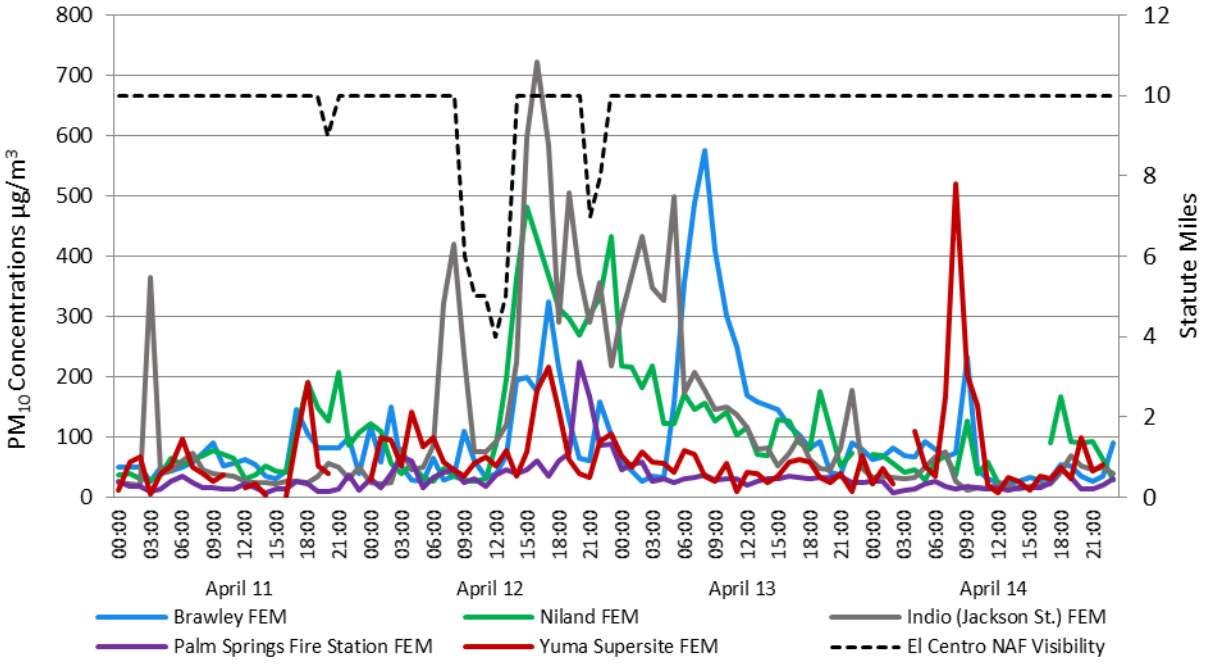

Fig 5-7: The graph illustrates the PM_{10} concentrations relative to visibility as reported from the El Centro NAF. Air Quality data from the EPA's AQS data bank. Visibility data from the NCEI's QCLCD data bank

Figures 5-8 and **Figure 5-9** are the resultant Air Quality Indices (AQI) posted on the ICAPCD webpage for April 12, 2014 and April 13, 2014.[9] The Air Quality Index for Niland on April 12, 2014 remained in the "Moderate" or Yellow category from 1 a.m. to 6 p.m. From 6 p.m. to 12 a.m. the AQI remained at the "Unhealthy for Sensitive Groups or "Orange," supporting that fugitive dust transported by high winds had impacted the quality of air in Imperial County. The Air Quality Index for Brawley on April 13, 2014, remained in the "Moderate" or Yellow category from 1 a.m. to 10 a.m. From 11 a.m. to 12 a.m. the AQI remained at the "Unhealthy for Sensitive Groups or "Orange," supporting that fugitive dust transported by high winds had impacted the quality of air in Imperial County.

[9] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: https://airnow.gov/index.cfm?action=aqibasics.aqi

FIGURE 5-8
IMPERIAL VALLEY AIR QUALITY INDEX IN NILAND APRIL 12, 2014

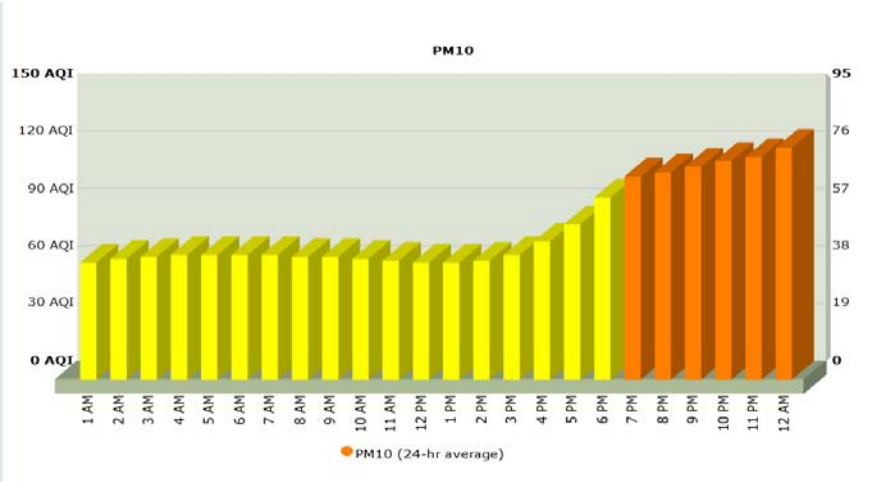

Fig 5-8: Demonstrates that air quality in Imperial County was affected by gusty winds on April 12, 2014

FIGURE 5-9
IMPERIAL VALLEY AIR QUALITY INDEX IN BRAWLEY APRIL 13, 2014

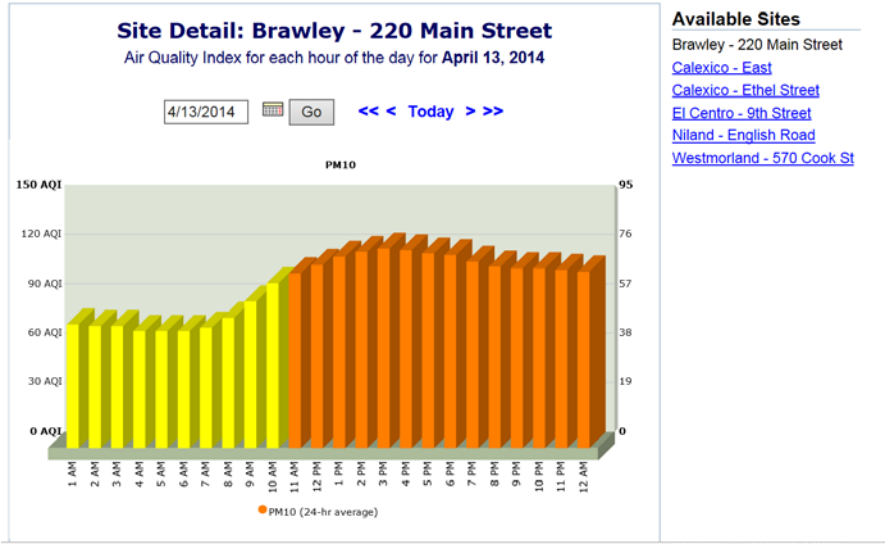

Fig 5-12: Demonstrates that air quality in Imperial County was affected by gusty winds that impacted the Brawley monitor on April 13, 2014

V.2 Summary

The preceding discussion including graphs, figures, and tables of wind direction, speed, and PM_{10} concentration data show that the exceedances recorded by the Niland and Brawley monitors on April 12, 2014 and April 13, 2014, respectively, were caused by strong, gusty winds associated

with an upper-level low pressure system that affected southeastern California and much of west central Arizona. Forecasts calling for high winds and blowing dust/sand and and issued air quality index notices illustrate the effect upon air quality within the region extending from all of Imperial County and the eastern portion of Riverside County into Yuma, Arizona. Large amounts of coarse particles (dust) and PM_{10} were carried aloft by strong westerly winds into the lower atmosphere. The likely area of origin is the desert areas located and part of the Sonoran Desert in Imperial County. Combined, the information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedances measured at the Niland and Brawley monitors on April 12, 2014 and April 13, 2014, respectively.

VI. Conclusions

The PM_{10} exceedances that occurred on April 12, 2014 and April 13, 2014, satisfy the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1[10] TECHNICAL ELEMENTS EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		Document Section
1	whether the event was **not reasonably controllable or preventable** (nRCP)	31-35
2	whether there was **a clear causal** relationship (CCR) "There is a clear causal relationship between the measurement under consideration and the event…"	36-45
3	whether the event **affects air quality** (AAQ) ...the event that is claimed to have affected the air quality in the area.."	12-24; 36-45
5	whether the event was caused by human activity unlikely to recur or was a natural event (HAURL / **Natural Event**) "The event satisfies the criteria set forth in 40 CFR §50.1(j)" for the definition of an exceptional event (see above).	31-35

VI.1 Affects Air Quality

The preamble to the EER states that an event is considered to have affected air quality if it can be demonstrated that there is a clear causal relationship between the monitored exceedance and the event, and that the event is associated with a measured concentration in excess of normal historical fluctuations. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that the event in question affected air quality.

VI.2 Not Reasonably Controllable or Preventable

In order for an event to be defined as an exceptional event under section 50.1(j) of 40 CFR Part 50 an event must be "not reasonably controllable or preventable." This requirement is met by demonstrating that, despite BACM in place in Imperial County, high winds overwhelmed all BACM controls. The PM_{10} exceedances measured at the Niland monitor and discussed within this report was caused by naturally occurring strong gusty winds that transported fugitive dust into Imperial County and other parts of southern California from areas located within the Sonora Desert regions to the west of Imperial County. These facts provide strong evidence that the PM_{10} exceedance on April 12, 2014 and April 13, 2014, was not reasonably controllable or preventable.

[10] 40 CFR §50.1

VI.3 Natural Event

As discussed within this demonstration, the PM_{10} exceedance which occurred in Niland and Brawley on April 12, 2014 and April 13, 2014, was caused by transport of fugitive dust into Imperial County by strong predominantly westerly winds associated with an upper-level low pressure system. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at different sites in Imperial and Riverside county demonstrates a consistency of elevated concentrations of PM_{10} at the Niland and Brawley monitors on April 12, 2014 and April 13, 2014, respectively (Section V). In addition, these time series plots, together with graphs showing elevated wind speeds during this period, demonstrate that both the high PM_{10} concentrations and the gusty winds were widespread, regional, and uncontrollable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty winds. Finally, days immediately before and after the high wind event had PM_{10} concentrations well below the NAAQS.

VI.5 Historical Norm

The historical annual and seasonal 24-hr average PM_{10} values measured at the Niland and Brawley monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1)(i))

This section contains forecasts issued by the NWS April 12, 2014 and April 13, 2014 for a wide area including southeastern California and much of west central Arizona. The documentation supports the region-wide affect of the weather system.

Appendix B: Meteorological Data

This appendix contains graphs, wind roses, and tabular data for selected monitors in southeastern California and southwestern Arizona. It supports that gusty winds recorded at upstream sites played an essential role in the exceedances at both stations.

Appendix C: Correlated PM_{10} Concentrations and Winds

This appendix contains the graphs depicting the relationships between PM_{10} concentrations and elevated wind speeds for selected monitors in Imperial and Riverside counties, along with Yuma, Arizona. These graphs show an increase in PM_{10} concentrations in Imperial County coincident with the arrival of high wind speeds and wind gusts.

Appendix D: Regulation VIII – Fugitive Dust Rule

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.